



**CAMBRIDGESHIRE
FIRE & RESCUE SERVICE**

Working together to improve community safety

FIREFIGHTER SELECTION

FITNESS INFORMATION

The advice provided here can only be general; prospective applicants that require further information are advised to seek individual advice, specific to their needs, from a qualified fitness professional.

General Exercise Guidance

The role of a firefighter can at times be physically demanding. Therefore the entry selection tests are designed to reflect and assess the physical tasks that firefighters are required to perform. Firefighters are required to be aerobically fit, have good all-round body strength and local muscular endurance. Good exercise training advice is highly specific to the individual.

Safety Points

If you are in any doubt about your health or physical ability to exercise, consult your doctor before you commence physical activity. This is especially important if you are pregnant (or think you may be pregnant) or have not exercised for the last six-months or had a recent illness or injury.

Always warm up before commencing any exercise. Wear the correct clothing and footwear; do not train if you are unwell or injured.

Preparing for Exercise (Warm Up)

Performing a warm up prepares the body for the activity about to be undertaken. The length of time needed to warm up correctly depends on many factors; however, you should allow at least 10 minutes for this very important activity. In order to reduce the risk of injury in the warm up period, a number of steps should be followed:

Be Specific:

Make sure your warm up session is geared towards the activity that you intend to perform. Cardiovascular workouts, for example running, you should start with a brisk walk leading into a light jog. For weight training workouts it is important to warm up the joints and muscles that are involved in the resistance exercise. This will increase blood flow to the muscles which will be utilised during the exercise and activate the nervous system prior to any additional stress being placed on them.

Start Slowly:

At the start of your workout your muscles will be relatively cold. Start exercising slowly and build up the intensity throughout the warm up period. This will increase your muscle temperature steadily and keep the risk from injury to a minimum.

Keep Warm:

If you are exercising in a cold environment, wear additional clothing during the warm up period and try not to stand still for too long.

Stretching:

For many years it was thought that stretching immediately prior to exercise would prevent injuries. However, there is new research with practical application that suggests that this may not prevent muscle or tendon injury. Any form of flexibility or stretching activity should be performed following a warm up period or an exercise session.

How to Improve Physical Fitness

Improving your physical fitness will require some self discipline and efficient use of your spare time, as an effective exercise routine needs to be completed on a regular basis.

In order to improve your physical fitness you will need to alter the frequency, intensity, and duration of your exercise above your current level. Your training should be gradual and progressive. You should start small and build up the intensity. This will produce a training effect by placing greater demands on your body. In general, the less exercise you perform the lower the training effect, and the more exercise you perform the greater the training effect. Whilst certain exercises are more specific to firefighting tasks, the need for maintaining muscular strength, endurance, and flexibility of the major muscle groups, through a well-rounded training program, which includes aerobic, resistance and flexibility exercises is recommended. Although age in itself is not a limiting factor to exercise training, a more gradual approach in applying the prescription at older ages seems prudent.

Aerobic Training

Depending on your current aerobic fitness standard, you will need to follow the following guidelines to improve your aerobic fitness.

Frequency of training: 3 to 5 days per week.

Intensity of training: 55 to 90 percent of your Predicted Maximum Heart Rate (PMHR)

Heart rate monitors are a useful tool to help ensure that you train at the right intensity. If you have access to a heart rate monitor you can calculate your desired training intensity by using the following equation:

Heart rate percentage of 55-90 percent of your Predicted Maximum Heart Rate (PMHR) is calculated by: $220 \text{ minus your Age equals your Predicted Maximum Heart Rate}$.

Predicted Maximum Heart Rate X 0.7 for 70 percent, and 0.8 for 80 percent etc. = heart rate percentage

Or,

Level 10-17 on your Rating of Perceived Effort (RPE) scale

Level 6	- 20 percent effort	- rest
Level 7	- 30 percent effort	- very, very light
Level 8	- 40 percent effort	
Level 9	- 50 percent effort	- very light - gentle walking
Level 10	- 55 percent effort	
Level 11	- 60 percent effort	- fairly light
Level 12	- 65 percent effort	
Level 13	- 70 percent effort	- moderately hard - steady pace
Level 14	- 75 percent effort	
Level 15	- 80 percent effort	- hard
Level 16	- 85 percent effort	
Level 17	- 90 percent effort	- very hard
Level 18	- 95 percent effort	
Level 19	- 100 percent effort	- very, very hard
Level 20	- Exhaustion	

Duration of training:

20 to 60 minutes of continuous or intermittent aerobic activity minimum of 10-minute bouts accumulated throughout the day. Duration is dependent on the intensity of the activity; thus, lower-intensity activity should be conducted over a longer period of time 30 minutes or more, and, conversely, individuals training at higher levels of intensity should train at least 20 minutes or longer.

Type of activity:

Any activity that uses large muscle groups, which can be maintained continuously, and is rhythmical and aerobic in nature, e.g. walking-hiking, running-jogging, cycling-bicycling, cross-country skiing, aerobic dance/group exercise, rope skipping, rowing, stair climbing, swimming, skating, and various endurance game activities or some combination thereof.

Specificity:

To maximise the efficiency of your training you should focus on exercises that are similar to those in the test. These include running-jogging, stepping, stair climbing and other weight bearing activities.

Resistance Training

In order to improve your strength and/or muscular endurance you will need to exercise against a resistance. This resistance can be your body weight, for example a press up, or the use of specifically designed equipment such as dumbbells, barbells or resistance machines. Resistance training should be progressive in nature, individualised, and provide a stimulus to all the major muscle groups that is sufficient to develop and maintain muscular strength and endurance. You should follow the subsequent guidelines to improve your muscular strength and endurance.

Frequency: 2 to 3 days per week.

Exercises:

At least one set of 8 to 15 repetitions of 8 to 10 exercises that condition the major muscle groups of the body. Multiple set regiments may provide greater benefits if time allows. The effect of exercise training is specific to the area of the body being trained. For example, training the legs will have little or no effect on the arms, shoulders, and trunk muscles, and vice versa. Therefore a whole body approach should be adopted. Muscles should also be worked in balance and as such the following exercises are recommended; chest press, seated row, shoulder press, lat pull down, squats, lunges, step-ups, abdominal crunch, back extensions.

Rest:

If performing multiple sets, adequate rest should be given to allow the muscles to recover before performing another 'set'.

Note - Individuals should not perform the same resistance exercise on consecutive days. At least 24 hours rest should be allowed before repeating the exercise.

Chest Press

1. Whilst lying flat on the bench with feet planted firmly on the floor either side of the bench with your arms extended.
2. Slowly lower the weight to chest level. Push the weight back to the start position.

Tips: Ensure that back is flat on the bench and not arched. Perform slowly and in control.

If you are not a member of a gym you can do the following push ups:

Full Push Up

Muscles worked: Chest and Tricep

Suggested Sets/Reps: 3 x 15

1. Assume the $\frac{3}{4}$ push up start position.
2. Slowly extend the legs backwards, and push up onto the balls of your feet.
3. Make sure that your body is in a straight line. The shoulders should be relaxed and not arched up to the ceiling. Ensure that the hands are greater than shoulder width apart.
4. Bend the arm and lower the whole body in a straight line towards the floor. The nose, chest and abdomen should come down as one, and then extend the arms and push yourself back up into the start position.
5. Ensure that the movement is slow and controlled and that the back stays straight.
6. If your back arches excessively towards the floor, you must pull the navel into your spine and tilt your pelvis under to flatten it out.

Box Push Up/ $\frac{3}{4}$ Push Up

Muscles worked: Chest and Tricep

Suggested Sets/Reps: 3 x 15

Box Push Up

1. Kneel down on all fours, ensure that your knees are directly below your hips and wrists are directly below your shoulders.
2. Ensure that your back is straight. If you are arching up towards the ceiling this indicates that your hands and knees are too close together. If you are arching your back towards the floor this indicates the hands and knees are too far apart.
3. Bend the arms at the elbows and slowly lower your face to the floor.
4. Ensure that you keep your nose in front of your hands, to avoid shifting the weight back to your legs.
5. Lower the nose to the floor, then push through the arms and extend them so you lift back up onto all fours.

$\frac{3}{4}$ Push Up

1. Begin on all fours as in the box push up. Walk the hands forwards so that your hips move forwards. Your thighs should be at a 45 degree angle to the floor.
2. The weight should be shifted forwards onto your hands, which should be positioned slightly wider than shoulder width apart.
3. Ensure that your pelvis is tilted under so that your back is straight. Do not excessively arch the back down towards the floor.
4. Slowly bend the arm at the elbow and lower your face and body towards the floor.
5. Your nose and chest should come down to the floor, then push through the arms and lift back up into the start position.

Shoulder Press

1. From an upright position, with dumbbells overhead, slowly lower the weight to shoulder level. Push the weight back up to the start position.

Tips: Ensure the back is flat on the bench. Perform slowly and in control. Look straight ahead.

If you are not a gym member you can use weights that can be found around the home.

Lat Pull Down

1. From a seated position, grasp the overhead bar just wider than shoulder width. Lean back slightly and draw the elbows in towards the side of the body so that the bar rests at the top of the chest.

Tips: Do not swing during the exercise.

Tricep Dip

Muscles Worked: Tricep

Suggested Sets/Reps: 3 x 10/15

1. Sit on a bench or a step and place your hands either side of your body on the edge of the bench.
2. Shuffle your weight off the bench so that your arms are extended and your body weight is supported by just your feet and arms.

3. Bend the arms and slowly lower your upper body down towards the floor, keeping the arms on the bench.
4. When your elbow is flexed to 90 degrees, begin to extend the arm and lift yourself up again.
5. Keep the legs bent at all times to start with.
6. To increase the intensity lay the legs out straight in front, or elevate them off the floor.

Squat

1. From a standing position with feet between hip and shoulder width apart, bend at the knees and flex at the hip until your thighs are parallel with the floor. Push through the heels to return to the standing position.

Tips: Ensure that the knees are aligned with the feet and do not pass beyond the toes.

Lunge

1. From a split leg position, with one foot in front of the other, lower the back knee towards the floor so that the front thigh is almost parallel with the ground. Push off the front leg to return to the start position.

Tips: Look straight ahead. Ensure the front knee is aligned with the foot and does not pass beyond the toes.

Abdominal Crunch

1. Lie face up on a soft surface, bend knees and bring feet close to the buttocks. Fold your arms across your chest, or place the hand lightly behind the head. Draw your belly button towards your spine by contracting your lower abdominal muscles. Whilst holding this contraction with normal breathing, slowly raise your shoulders towards your thighs while keeping the lower back on the floor.

Tips: Lower your shoulders and upper body slowly and with control.

Back Extension

1. Lie on your stomach on a mat. Place your arms at your sides so that your hands are by your hips. Raise your head and shoulders off the mat as high as comfortably possible. Hold for 1 to 2 seconds. Lower the head and shoulders.

Tips: Do not tense your shoulder muscles.

Flexibility

Flexibility exercises should be incorporated into the overall fitness program sufficient to develop and/or maintain range of motion. These exercises may also reduce the likelihood of injury, reduce muscle soreness following exercise and may enhance muscular performance. These exercises should stretch the major muscle groups of the body. There are a number of forms of stretching techniques. However those without specific up-to-date knowledge in this area you are advised to adhere to the following guidelines.

Frequency: 2 to 3 days per week.

Duration: Hold the stretch 1 to 3 times in a static or still position for 10 to 30 seconds.

Exercises: Below is a list of recommended stretching exercises that should be performed:

Triceps and Upper Back Stretch

1. Sit or stand upright with one arm flexed, raised overhead with elbow next to your ear, and your hand resting on your opposite shoulder blade.
2. Grasp your elbow with the opposite hand.
3. Inhale and pull your elbow behind your head.
4. Hold the stretch and relax.
5. You should feel the stretch in the back of the arm.

Rear Deltoid and Upper Back Stretch

1. Sit or stand with one arm straight.
2. With the other hand grasp the elbow of the straight arm.
3. Inhale and pull the elbow across the chest and in towards the body.
4. Hold the stretch and relax.
5. You should feel the stretch in the back of the shoulder and upper back.

Pectoral and Upper Back Stretch

1. Kneel on the floor facing a bench or chair.
2. Extend your arms above your head with your hands side by side and bend forward to rest your hands on the bench or chair with your head in its natural position.
3. Exhale and let your head and chest sink towards the floor.
4. Hold the stretch and relax.
5. You should feel the stretch in your chest and upper back.

Quadriceps Stretch

1. Stand upright with one hand against a surface for balance and support.
2. Flex the opposite knee to the hand that is outreached and raise your heel to your buttocks.
3. Slightly flex the supporting leg.
4. Exhale, reach behind, and grasp your raised foot with the other hand.
5. Inhale, and pull your heel towards your buttocks.
6. Hold the stretch and relax.
7. You should feel the stretch in the top of the thigh.

Hamstring Stretch

1. Sit upright on the floor with both legs straight.
2. Flex one knee and slide the heel until it touches the inner side of the opposite thigh.
3. Lower the outer side of the thigh and calf of the bent leg onto the floor.
4. Exhale, and while keeping the extended leg straight, bend at the hip and lower your extended upper torso from the hips towards the extended thigh.
5. Hold the stretch and relax.
6. You should feel the stretch in the back of the thigh.

Adductor Stretch

1. Sit upright on the floor with your legs flexed and straddled and feet flat against one another.
2. Grasp your feet or ankles and pull them as close to your groin as possible.
3. Exhale; rest your elbows on your knees, pushing them down towards the floor.
4. Hold the stretch and relax.
5. You should feel the stretch in the inside of the thighs.

Calf Stretch

1. Stand upright slightly more than an arms length from a wall.
2. Bend one leg forward and keep the opposite leg straight.
3. Keep the heel of your rear foot down, sole flat on the floor and feet pointing straight forward.
4. Exhale, and flex your forward knee toward the wall.
5. Hold the stretch and relax.
6. After 10 to 15 seconds slightly flex the knee of the back leg keeping the heel of the foot down.
7. Hold the stretch and relax.
8. You should feel the stretch in the back of the lower leg.

Buttocks and Hip Stretch

1. Lie flat on your back with one leg crossed over the knee of the straight leg.
2. Inhale flexing the uncrossed leg off of the floor in towards the body ensuring that your head shoulders and back remain on the floor.
3. Hold the stretch and relax.
4. You should feel the stretch in your bottom and back.

GENERAL PHYSICAL FITNESS PROGRAMME

The following programme is 8 weeks long and is an example of how you could go about training to pass the selection tests. It consists of 3 running sessions, 2 weights sessions and 2 flexibility sessions per week. The programme starts relatively easy and gets progressively harder. You should alternate between your running and weight sessions so that you do not perform the same training on consecutive days e.g.

Mon / Fri	-	steady run
Tue / Sat	-	weights
Wed	-	fartlek
Thurs / Sun	-	flexibility

If you miss an exercise session, do not attempt to do 2 sessions in 1 day to make up. If you are unwell or injured then do not train until you have fully recovered.

Make sure you have read and understood the programme before you start training.

Below is an explanation of all the sessions included in the programme. The actual details of the workouts are set out on the back of the 8 week plan.

Steady pace running: This should be performed at a comfortable pace i.e. you should be able to hold a conversation throughout your run. This type of exercise will increase your aerobic fitness. This is included 2 times per week in the programme.

Fartlek training: This type of running involves changing pace throughout the session. A steady pace of running should be interspersed with faster running, sprints, jogging, uphill running and walking. The aim of the session is to work continuously for about 20 minutes using the various speeds of running whenever you feel like it. There is no set order to this session; however you should begin with about 5 minutes of steady running before you do any faster running. This session will increase your aerobic and anaerobic fitness.

Note - Where possible you should run on grass or trails, try to avoid road running. This will reduce the stress placed on the joints of the body.

Resistance training: These sessions will target all the major muscle groups and will help to improve your muscular strength and endurance.

Flexibility training: This is to help improve or maintain your range of motion. These exercises may also reduce the likelihood of injury, reduce muscle soreness following exercise and may enhance muscular performance.

Example of 8 week training programme:

WEEK	SESSIONS	DURATION	INTENSITY	TIMES PER WEEK
WEEK 1	Steady pace run	20 minutes	55-90 percent of PMHR or RPE level 10-17	2
	Weights	1-2 sets of 12-15 reps		2
	Fartlek	20 minutes		1
	Flexibility	10-30 seconds		2
WEEK 2	Steady pace run	20 minutes	55-90 percent of PMHR or RPE level 10-17	2
	Weights	2 sets 12-15 reps		2
	Fartlek	20 minutes		1
	Flexibility	10-30 seconds		2
WEEK 3	Steady pace run	20 minutes	55-90 percent of PMHR or RPE level 10-17	2
	Weights	2 sets 12-15 reps		2
	Fartlek	20 minutes		1
	Flexibility	10-30 seconds		2
WEEK 4	Steady pace run	25 minutes	55-90 percent of PMHR or RPE level 10-17	2
	Weights	3 sets 10-12 reps		2
	Fartlek	20 minutes		1
	Flexibility	10-30 seconds		2
WEEK 5	Steady pace run	25 minutes	55-90 percent of PMHR or RPE level 10-17	2
	Weights	1-2 sets of 12-15 reps		2
	Fartlek	20 minutes		1
	Flexibility	10-30 seconds		2
WEEK 6	Steady pace run	30 minutes	55-90 percent of PMHR or RPE level 10-17	2
	Weights	2 sets 12-15 reps		2
	Fartlek	20 minutes		1
	Flexibility	10-30 seconds		2
WEEK 7	Steady pace run	30 minutes	55-90 percent of PMHR or RPE level 10-17	2
	Weights	2 sets 12-15 reps		2
	Fartlek	20 minutes		1
	Flexibility	10-30 seconds		2
WEEK 8	Steady pace run	30 minutes	55-90 percent of PMHR or RPE level 10-17	2
	Weights	3 sets 10-12 reps		2
	Fartlek	20 minutes		1
	Flexibility	10-30 seconds		2

Warning: A significant reduction in aerobic fitness occurs after only 2 weeks of not training.