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Fire & Rescue Service
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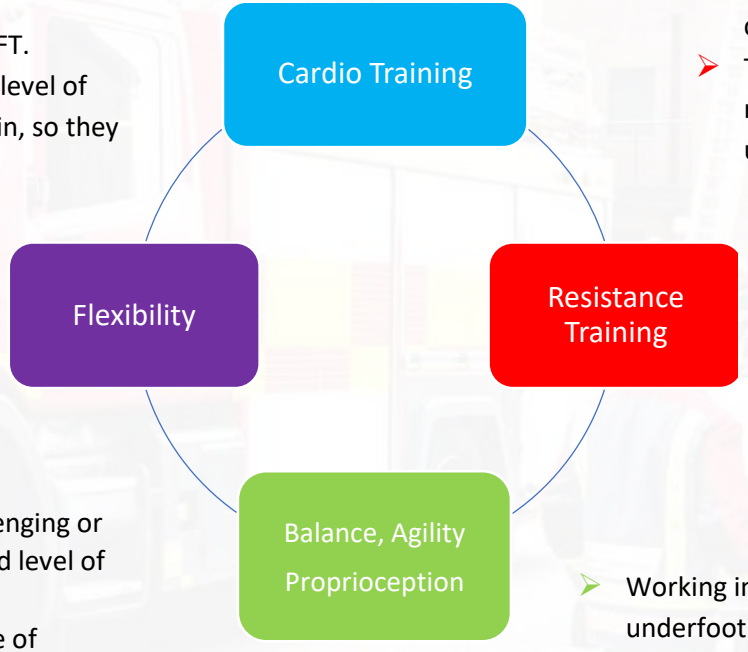
Get FireFit Specific

Firefighters are required to have a good all-round level of fitness. The chart below demonstrates the various fitness components that are essential physical attributes required, with a justification as to why they are important.

- The tasks that a firefighter undertake whilst wearing PPE are demanding, and require a good level of cardiovascular fitness.
- All Nottinghamshire Fire and Rescue operational firefighters are required to undertake an annual fitness test to the national standard VO2 of 42.3 ml/kg/min.
  This is the equivalent to 8.7 on the MSFT.
- However, this should be the minimum level of fitness that a firefighter should maintain, so they are not working to maximum capacity.



- Lifting and carrying heavy equipment demands a level of physical strength, so tasks can be completed comfortably, with the stamina to continue.
- These include handling ladders, hose running, carrying equipment and using the cutting equipment.

- Firefighters need to be able to manoeuvre their body through challenging or tight confined space, requiring a good level of flexibility.
- A lack of flexibility will limit the range of motion, placing stress on joints, which can then potentially result in injury such as muscle strains or ligament damage.

- Working in dark conditions with debris underfoot is not uncommon for a firefighter.
- The body's ability to react quickly to a slip or trip depends on the neurological pathway from our joint to our brain to initiate a reaction.

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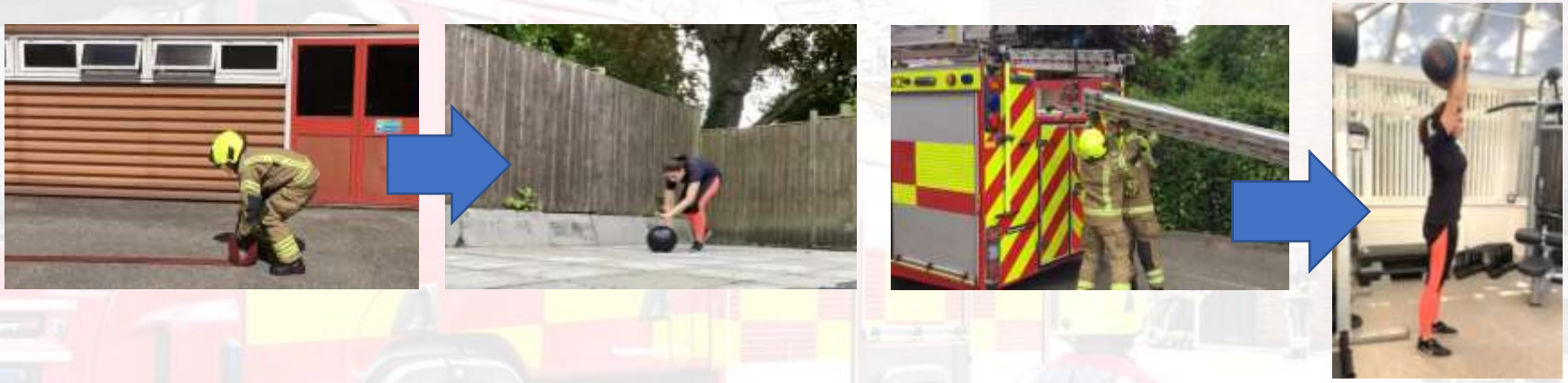
Get FireFit Specific

Due to Covid-19 restrictions, you may be faced with the challenge of training without access to a gym...
So, it is time to get creative!
If you are training at home, you do not need to have access to a multi gym with expensive equipment. Throughout the programme, look out for the light bulb which offers tips for using equipment you may have at home to add some resistance.



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Get FireFit Specific Needs Analysis

Identify any Gaps

Throughout your training, you can establish and monitor your own training status in relation to the demands of the role outlined. From this, you are encouraged to complete a Needs Analysis based on the recommended physical attributes and ability. The Needs Analysis encourages you to explore your training history, what has your training previously involved, how often, what modes, what you like, dislike, barriers, injuries or weaknesses. It may be that you stick to following a specific training regime that you most enjoy, such as predominately cardio or weights, which is common. However, this can come at a risk of neglecting other essential components that are essential for a firefighter to possess.

Taking some time to think about your training history will also help you to establish your current baseline whilst identifying any gaps in your training. You can then ensure these are factored into your programme, helping you to achieve your goals.

Set Your Goals

Planning what you are aiming to achieve will help you to ensure you get the best out of your training sessions.

Setting **SMART: Specific Measurable Achievable Realistic Timebound** goals and following a specific programme will help you to stay on track and monitor your progression.

History

Need

Identify

Firefighter Fitness Training

History - **Establish your baseline**

Complete your Needs Analysis on blank paper, like a mind map, to note down your training history.
Think about:

- ✓ Your training history; both long term and short term
- ✓ Frequency, intensity, duration and type
- ✓ Have you had a focus i.e. sport or event specific
- ✓ What motivates you and what do you enjoy
- ✓ Barriers or dislikes
- ✓ Any previous injuries/weaknesses

Need

Based on the specific tasks required for the role of a firefighter. For example; hose running, ladder lift, equipment carry, rescue and working in dark confined spaces

- ✓ Cardiovascular Endurance
- ✓ Muscular Endurance
- ✓ Muscular Strength
- ✓ Coordination and Balance
- ✓ Flexibility
- ✓ Speed, power, agility
- ✓ Reaction time

Identify

This task will help you to identify any gaps in your training, so you can ensure you include these components in your programme.

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Monitoring Exercise Intensity
How hard should it feel?

To ensure you are getting the best out of your exercise sessions it is essential that you listen to your body and monitor the exercise intensity. **To improve fitness, you need to be working at a high enough intensity to overload and progress.**
There are various validated tools you can use to monitor intensity. It would be advisable to use a variety of these rather than relying on one method to measure your exertion.
Three tools include Rate of Perceived Exertion (RPE), Talk Test., and Heart Rate Monitoring. All three are used for monitoring cardiovascular exercise, with the RPE scale most commonly selected for monitoring resistance exercise. Heart rate monitoring is discussed on page 15.

Rate of Perceived Exertion – RPE

The rate of perceived exertion scale is a tool which enables you to assess your exercise intensity, whilst correlating to your given effort and how it makes you feel. The Borg Rating of Perceived Exertion scale is 6 – 20, however you may prefer the 1 -10 category ratio scale, both of which are displayed below.

Borg scale 6 – 20	Perceived Exertion	Category Ratio 1 – 10	% Effort
6	No exertion at all	0	20%
7	Extremely light		30%
8		1	40%
9	Very light		50%
10			55%
11	Light		60%
12		3	65%
13	Somewhat hard		70%
14		5	75%
15	Hard (heavy)		80%
16		7	85%
17	Very hard		90%
18			95%
19	Extremely hard	10	100%
20	Maximal exertion		Exhaustion

How Does It Feel? Can you Talk?

It is good practice throughout your exercise session to ask yourself how the intensity feels.
Are you working hard enough to improve your fitness?

Moderate intensity would be measured around 5 out of 10 using the 1-10 scale. You generally should still be able to talk, you will feel warmer and slightly sweaty, but it is not uncomfortable.

Vigorous intensity would be measured above 6 out of 10, using the 1 – 10 scale. You will not be able to hold a conversation and may be feeling uncomfortable during this high intensity zone.

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Resistance Training

Where to begin

A firefighter needs to have both muscular strength and endurance to be able to carry out core duties effectively, without posing a risk of injury. Strength is required for ladder lifting, whereas carrying heavy equipment, rescuing a person in an incident and hose running, which take place over a longer duration, require both muscular strength and muscular endurance.

For well-rounded results, it is not necessary for your training to be complex, just that it be specific for you and includes a combination of methods to train for both muscular strength and endurance. Your programme should focus on the whole-body, whilst tailored to target any specific weaknesses. Progression and rest are essential elements to be included within your programme, to allow time for your body to develop, adapt and recover.

The resistance training in this programme offers a blend of functional training in a circuit format, core training and traditional resistance sessions, giving a well-balanced approach to prepare your body for the challenges of firefighter tasks.

Base Training Phase - Week 1 to 4

It is strongly recommended that you complete the base training phase if you have not engaged in regular resistance training sessions over the past three months.

The base training phase offers an introduction to general resistance training which is a great place to start if you are new to this training mode. This phase is an opportunity for correct technique to be mastered, helping to mitigate injury. Focusing on developing muscular endurance will allow the body to gradually adapt to the stress of overload from resistance training, creating a solid foundation to progress onto the next phase.

Development and Familiarisation Phase – Week 5 to 8

Following a period of base training, resistance training will progress from an endurance focus towards hypertrophy (*increase lean body mass with both endurance and strength gain)*, preparing the body for the transition to the demands of strength training. In addition, exercises that incorporate specific tasks that correlate with the physical demands of the firefighter role will be introduced.

Strength and Endurance Phase – Week 9 to 12

During this phase, sessions will incorporate a mixture of training methods, enabling your body's muscular strength and endurance ability to continue to adapt, develop and progress.

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Resistance Training

Guidance

How Often?

General guidelines recommend training major muscle groups 2 -3 days per week.
Allow 48-hour recovery between each session or training a specific muscle group.
You can choose a whole-body approach in the same session. Individuals that are intermediate and advanced can train 3 – 7 sessions per week by splitting their training, selecting specific muscles groups on different days. For example, upper body/lower body, or push exercises/pull exercises.

Exercise Selection and Order

Your training programme should incorporate both compound and isolation exercises:

- ✓ **Compound exercises** target multi-joint or major muscle groups such as squats, leg press, shoulder press, chest press and latissimus dorsi pull down.
- ✓ **Isolation exercises** target single joint major muscles such as bicep curls, triceps extensions, front raise, leg extensions and leg curls.
- ✓ **Carry out compound exercises** before moving onto isolation exercises. If your programme is whole-body approach, you may choose to alternate between upper and lower body exercises, or push and then pull to allow sufficient recovery.
- ✓ **Ensure you work opposing muscle groups** to avoid muscle imbalance – such as bicep curls and tricep press, core exercises and back extensions, hamstring curls and leg extensions for quadriceps.
- ✓ Perform exercises through **full range of motion**, ensuring good technique at all times.

Repetitions, Sets and Recovery

Training Goal	Repetitions	Sets	Recovery between sets
Muscular Endurance	>12	2-3	< 30 seconds
Hypertrophy Increase lean body mass with both endurance and strength gain	6-12	3-6	30 – 90 seconds
Strength	<6	2-6	2 – 5 minutes

You may choose to work within the guidance above, using set working reps and sets. However, a circuit based approach is also an option; selecting a set duration, with a recovery period, completing as many reps as possible with good form within in that time. There is no right way, both options are perfectly fine. You will find a mix of both circuits and traditional training methods have been used in the programme. If you wish to change the session, that is fine, apply the principles outlined and choose which method you prefer.

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Cardiovascular Training

Where to begin

The cardiovascular element in the training programme is designed to progressively build your aerobic fitness over a number of weeks through longer steady sessions that focus on developing endurance ability, and higher intensity sessions that will equip you with the stamina to cope with high intensity anaerobic exercise, giving you that extra push when you start to fatigue.
Preparation for the bleep test is also included within the programme, with hints and tips on how to master technique and practice in advance of job related testing day detailed on page 17.

The plan begins with building consistency with regular training. The intensity of the sessions being to increase, pushing you harder and increasing your aerobic fitness. If you need to come back to a walk during any of the sessions, then do, take a recovery and then pick back up your pace again. Be true to yourself with monitoring intensity, if the session is a pace tempo – it should be hard, so think to yourself, can I work harder!

During cardiovascular exercise, such as running, cycling, tennis and rowing, the body will select the energy source within the body to provide the fuel required for the activity. This selection process is dictated by the intensity and duration of the exercise.

Training at an intensity below 80% of your maximum heart rate, the body will utilise oxygen to convert body fat to energy, this is known as aerobic exercise. As the intensity of exercise increases, the energy source gradually drifts towards carbohydrates becoming the preferred energy source, which no longer requires oxygen. The duration of sustaining exercise decreases the higher the intensity. However, as you become fitter and expose your body to exercise within the various zones, your body will adapt and become more efficient, enabling you to train within the higher intensity zone for longer periods of time.

% MAXHR	Effort/Training Zone
90-100%	VO2 Max/Performance (Maximum Effort)
80-90%	Anaerobic (Sprints/High Intensity/Lactate)
70-80%	Aerobic (Cardio Training/Endurance base)
60-70%	Weight Control (Fitness/Fat Burn)
50-60%	Light Activity (Warm-up/Recovery)

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Cardiovascular Training

How often and for how long?

✓ **3 – 5 times per week**

Guidance recommends adults engage in a minimum of 150 minutes of moderate aerobic physical activity or 75 minutes of vigorous aerobic physical activity, 3 – 5 days each week
(can include a combination of both) composing of various training types with rest and recovery days. However, **progression** needs to be gradual, and **overload** is required to improve fitness, which are discussed along with i**ntensity** over the next few pages.

What Type?

✓ **Running, bike, rower, cross trainer, circuits or interval training, swimming … whatever you enjoy!**

Choosing aerobic exercise that you enjoy will help to encourage adherence.
Include specific exercise on feet is advisable, such as running, with a blend of off feet training such as cycling and rowing, enabling you to train aerobically whilst reducing the stress from your joints.

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Cardiovascular Training

Monitoring Exercise Intensity

There are various methods to monitor the intensity of your exercise, including the RPE scale and the talk test discussed on page 10. Using a mixture of tools would be recommended, as your perception of how hard a session feels may reflect differently when compared to your heart rate monitor.

Heart rate monitoring

There is a close relationship between your heart rate response and the zone in which you are exercising. You can use the Karvonen method below to calculate your specific expected heart rate zones for your desired intensity.

Target heart rate = (220 – age – resting heart rate) x % intensity desired + resting heart rate

Example **Age** = 35 **Resting heart rate** = 65 **Assigned intensity zone** = 60% - 80% (220 – 35 – 65) = 120 120 x 0.60 = 72 72 + 65 = **137 beats per minute (bpm)**	**Required zone at 60%** (220 – 35 – 65) = 120 120 x 0.60 = 72 72 + 65 = **137 bpm** **Required zone at 80%** (220 – 35 – 65) = 120 120 x 0.80 = 72 72 + 65 = **161 bpm**	**Target heart rate** 60% = 137 bpm 80% = 161 bpm **This would be an RPE of: 11 - 15**

Training Methods

There are various training methods you can choose which have a different fitness gain. This will enable you to tailor your sessions depending on your goals.

STEADY STATE (Long Slow distance) - Great for building endurance
Duration 30 minutes +
Intensity 70% of target heart rate – RPE 13
Frequency 1 – 2 per week
Following warm up, maintain a continuous pace. Focus on longer duration, lower intensity.

PACE/TEMPO – Shorter sessions that are great for increasing aerobic capacity and lactate tolerance; reducing development of fatigue at high intensity
Duration 20 – 30 minutes
Intensity 80% of target heart rate – RPE 15
Frequency 1 – 2 per week
Following a warm up, **either** maintain a continuous pace at 80% (hard), **OR** interval between 80% (hard) and 60% (light). To progress increase duration.

FARTLEK – tough training method designed to increase speed, aerobic capacity and lactate tolerance
Duration 20 – 60 minutes
Intensity 70% - 85/90% of target heart rate – RPE 13-18
Frequency – 1 per week
Following a warm up, increase intensity to high zone. Maintain this zone for as long as you can. Push yourself and listen to your body. Once you can no longer maintain this, reduce the intensity to the lower zone to take an active recovery. As soon as you are ready, push back up again and repeat for the duration.

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Cardiovascular Training

Progression and Overload

- ✓ General advice recommends exercise frequency, intensity or duration should not increase more than 10% each week.
- ✓ You may reduce frequency short term to avoid risking too much overload, allowing your body to adapt during intensity increase.
- ✓ Progression should be gradual with appropriate recovery time.
- ✓ To improve your cardiovascular fitness, it is important to be exercising regularly at an intensity that overloads the body sufficiently to cause fitness gain.
- ✓ Too much training can lead to injury whereas not sufficient training or overload will not elicit gains required to improve.
- ✓ As a general guide, an individual could expect to see a 10 – 15% gain in cardiovascular fitness following a 12-week period of regular exercise. However**, it is important to note** that this depends on various individual factors such as exercise history, age and training intensity.

- ✓ ***Getting the balance right is important, so listen to your body!***

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Cardiovascular Training

Shuttle Run Practice Tips

The 20 metre Multi-Stage Fitness Test (MSFT) – bleep test

- ✓ Make sure you have the correct audio as there are varying fitness tests such as the 15-metre test. Apps are available for download and the chart on page 4 shows the number of shuttles for each level.
- ✓ Practice your turns, touching the line with one foot, turning and pushing off.
- ✓ Switch your lead leg on the turns if you can, to reduce stress through the joints.
- ✓ If you need to stop when practicing, that's fine. Take a quick recovery and join back in so you can get used to the increased speed.
- ✓ **The programme includes** fitness self-assessments, so you can record your progress with the MSFT. Using a firm surface is advisable for this (tarmac, football court, sports hall).
- ✓ Shuttle run practice is also factored into the cardio sessions. This can be done on a softer surface (park), and is designed to get you used to stopping, turning and running as various speeds.

Click here to access our playlist of fitness video's and select 'cardiovascular training', which discusses advice for aerobic training and preparation for the MSFT.

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Agility, Balance and Proprioception

Working in dark conditions with debris underfoot is not uncommon for a firefighter. The body's ability to react quickly to a slip or trip depends on the neurological pathway from our joint to our brain to initiate a reaction, which naturally declines with age. For this reason, it is good practice to incorporate exercises to develop balance, proprioception and agility, to reduce your risk of injury.

There are various ways you can develop your balance and proprioception. Exercises to challenge agility, balance and proprioception are built into the resistance and circuit training elements in programme.

Home Training Tip

Don't have a bosu ball?

Using a towel or a pillow are great alternatives, creating an unstable surface to practice balance.

AGILITY

- ✓ Clock squats
- ✓ Lateral stepping
- ✓ Lateral running
- ✓ Hopping

BALANCE

- ✓ Stand on one leg – close your eyes
- ✓ Balance on a bosu ball both feet – then one foot

PROPRIOCEPTION

- ✓ Catching and throwing a ball thrown from varying directions
- ✓ Balance on bosu ball
- ✓ Medicine ball exercises such as figure of eights

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Flexibility

Firefighters need to be able to manoeuvre through challenging or tight confined space, which requires a good level of flexibility. A lack of flexibility will limit the range of motion, placing stress on your joints, which can then potentially result in injury such as muscle strains or ligament damage. However, when time available for training is limited, it is common for flexibility training to be sacrificed.

- ✓ **Prior** to your training session, warm up thoroughly. Dynamic stretching will prepare the joints and muscles for the working session.
- ✓ **Following** your session, aim to stretch within 5 – 10 minutes of completing each session.

Pilates or Yoga will help you to develop body awareness, identifying any weakness or tightness you may have, leading to an improved posture, greater flexibility and a stronger core. It is also a fantastic way to take time out for some relaxation and important 'you' time.

Complete daily and after each workout. Hold the stretch for 15 – 20 seconds


Calf Stretch


Hamstring Stretch


Quadricep Stretch


Inner Thigh Stretch


Shoulder Stretch


Tricep Stretch


Upper Back Stretch


Chest Stretch

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Prepare for Exercise

Warm Up

The warm up is an important element designed to prepare your body for the session ahead. The aim of the warm up is to activate and increase the temperature of the working muscles, **without causing fatigue**, optimising the effects of your main session whilst also reducing the risk of injury and stiffness. Begin slowly, ensure your warm up is specific to your exercise session and factor in the environment you are training; outdoor session in cold conditions will require a longer warm up duration.

Cardiovascular Training

To warm up prior to a **cardiovascular training** session i.e. running, take time to begin with a gradual warm up, such as brisk walking, progressing into a light jog. The warm up should be around five minutes in duration, although this time will increase when training in colder environments.

Warm up prior to a functional circuit session

- **Begin with low intensity aerobic activity** walking, torso rotation and flexions, shoulder rolls, gradually progress intensity i.e. jogging.
- **Progress with dynamic movements** *arm swings, lunge with a twist, walking knee lift, hip openers, heel kicks, squats, walking lunges, lateral lunges.*
  Keep the movement controlled - avoid bouncing and jumping.
  Complete 8 – 10 reps of each movement whilst travelling, progressing the range of movement**.**
- **Increase intensity** – i.e. shuttle runs, lateral travel, varying directions, bend down floor touch and reach up overhead.

Warm up prior to a resistance session

- **5-minute walk/light jog or steady bike** (feel warmer, comfortable, able to talk).
- **Mobilisation and dynamic stretching** *wrist circles, shoulder rolls, arm circles, torso rotations and flexions, squats, hip openers, knee lifts, heel kicks.*
- **Weight preparation** – can include performing reps of the major muscles from your main session, with lighter resistance such as: light weights (50% working set), or just using bodyweight.

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Prepare for Exercise

Technique Tips

- ✓ Ensure that you adopt and maintain good posture throughout your training.
- ✓ Focus on the quality of your exercise, ensuring you perform each repetition through full range of movement with control.
- ✓ Check out your technique in a mirror or record yourself. You may be able to spot an adjustment to technique that you may not be able to feel.
- ✓ Always include a thorough warm up prior to commencing your working session.
- ✓ Make time for stretching after each session to reduce muscle soreness and joint stiffness.

Try This

Relax, exhale and draw in your tummy towards your spine, activating your core muscles.
Relax and repeat.
Mild core activation should be maintained throughout your exercise session, and is great to build into everyday activities to reduce your risk of injury, particularly in the lower back.

Tailor the programme to suit your need

From week five, you will notice that the programme offers an option to select either a cardio or resistance session on a Monday. On alternate weeks the session begins with shuttle practice, which you are encouraged to complete first. Then choose either the cardio or resistance session based on which you have a greater need to develop. Using the prompts in the needs analysis will help you to make your own assessment. If you are new to resistance training, it may be likely that you need to invest more time each week to develop your strength, so the additional resistance session would be advisable.

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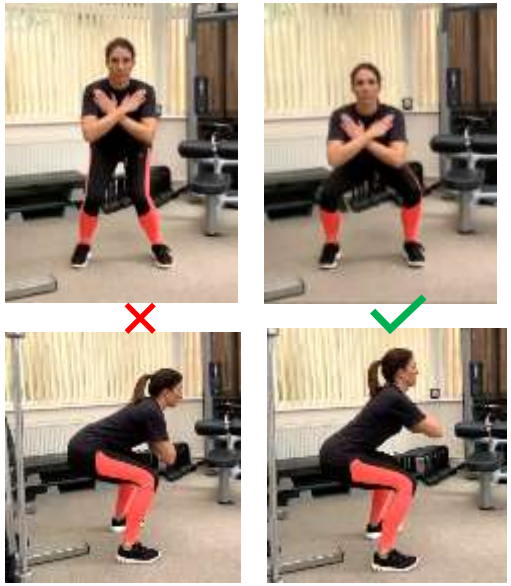
Prepare for Exercise

Squat Technique

It is important to focus on the quality of your exercises, to ensure you are performing them correctly. Allowing your body time to master technique before progressing will lead to correct muscle memory, enabling you to develop whilst continuing to maintain correct form, reducing your risk of injury.

The squat is a functional movement that is important to be performed correctly. A lack of joint flexibility and muscle strength can lead to common errors when squatting, including the chest tipping forward, knees falling in, and heels lifting from the floor.



As flexibility increases, and muscles strengthen providing stability to the joints, your squat can then be developed.

Where to Begin

Focus on:

- Keeping chest lifted
- Keeping knees out in-line with toes
- Heels on the floor

Bodyweight box squats

Can use a box, bench, chair or an object, your knee bend will be 90 degree when seated.
Feet slightly wider than hip distance apart, toes slightly turned out.
Cross arms over chest or take arms out in front.
On downward phase, focus on pushing hips backwards, sitting down on box for a moment, then push down through your feet, bringing hips forward to return to start.

Progress to Bodyweight squats

If knees fall in, or heels start to lift from the floor, reduce range of movement and do not go any deeper, begin upward phase by pushing through heels and bringing hips forward.

Add Resistance

Once you can complete a squat maintaining correct form, you can then add resistance.