

Warm-up phase exercises

- Gentle movements of the neck, shoulders, trunk, hips, knees and ankles repeated 4-6 times each.
- Start marching on the spot, building up to a slow jog over a 3 minute period.
- Specific dynamic mobility exercises focusing on hips, knees and ankles to prepare for running.
- Start jogging gradually building up the pace over 3 minutes to seamlessly commence the conditioning phase of your workout.

Conditioning phase training exercises

Short-term anaerobic endurance training

An example of a training programme of this nature targeting the PCr energy system suitable for sprint athletes is shown below:

Activity	Intensity	Repetitions	Distance or Time	Recovery period
Running	100%	10	100m	3-5 minutes
Cycling	100%	10-12	10 seconds	3-5 minutes

Long-term anaerobic endurance training

Combat sports such as boxing require repeated bouts of intense activity with short recovery periods. Anaerobic endurance training is essential for such sports. It is also very useful for athletes to develop strong finishes in middle distance races. An example of a training programme of this nature targeting the anaerobic Glycolysis energy system is shown below:

Activity	Intensity	Repetitions	Distance or Time	Recovery period
Running	90-100%	10-12	100m	30-60 seconds
Running	90-100%	8	400m	3 minutes
Cycling	90-100%	10-12	30 seconds	4-5 minutes

Aerobic endurance training

This form of cardiorespiratory endurance training is probably what will appeal to most people, as it is associated with many health and overall fitness benefits. It results in the body being able to deliver more oxygen to the tissues at any given level of exercise intensity, measured using $\text{VO}_2 \text{ max}$ - the maximum volume of oxygen that can be consumed in millilitres per kilogram of body weight per minute. Average values for a 20 to 40 year old man are approximately 40 ml/kg/min, whereas elite athletes may have a $\text{VO}_2 \text{ max}$ in excess of 90 ml/kg/min! Increases in $\text{VO}_2 \text{ max}$ are achieved by a combination of effects of aerobic endurance training notably, increased cardiac output, increased muscle capillary density, mitochondrial density and aerobic enzymes. There are various types of aerobic training suitable for different training purposes. Examples of these training programmes are outlined below:

Continuous Training

This type of aerobic training involves 30-60 minutes of continuous steady state exercise at 60-70% of HR_{max} and may be accomplished as running, cycling, rowing, swimming or the use of machines at the gym such as the treadmill, cross trainer, or rowing machine. It is useful for recovery in between more intense workouts and is perfectly adequate for the untrained or recreationally active. However, if you want to boost your VO_2 max, this type of training is not intense enough and you will need to do more high intensity interval training (HIIT) sessions as described below. This type of training is really useful though to prepare you for HIIT if you are starting from a low fitness base.

Threshold Training

This form of training involves exercising at an intensity level just above or below the threshold where lactate begins to accumulate. Threshold Training is also known as Tempo Training. Undertaking this form of training on a regular basis can increase the running speed that you can achieve before lactate starts to accumulate. It helps you to run faster without experiencing as much fatigue. After a sufficient low intensity continuous base has been established, you can introduce threshold training into your regime. An example is as follows:

Activity	Intensity	Repetitions	Distance or Time	Recovery period
Running - week 1	80%	4	5 minutes	2 minutes
Running - week 2	80%	4	6 minutes	2 minutes
Running - week 3	80%	4	8 minutes	2 minutes

High Intensity Interval Training

HIIT alternates high intensity anaerobic exercise with lower intensity aerobic recovery periods using precise work/rest ratios. It is an excellent form of training for increasing VO_2 max, athletic performance and for weight loss because of its effects on raising resting metabolic rate. Typical training regimes of this nature are shown below:

Activity	Anaerobic / Aerobic Ratio	Anaerobic Duration	Anaerobic Intensity	Aerobic Duration	Aerobic Intensity	Total Duration
Running	1:3	10 seconds	95-100%	30 seconds	80%	20-25 minutes
Running	1:2	30 seconds	90-95%	1 minute	75%	20-25 minutes
Running	1:1	1 minute	85-90%	1 minute	70%	20-25 minutes

A variation of interval training known as Fartlek (the Swedish word for speed play) is a fun, unstructured way of doing interval training if you prefer running in the outdoors. It entails running at different speeds, using landmarks such as trees, lampposts or variations in the terrain to increase or decrease pace back and forth from the anaerobic to aerobic zones.

Combined regimes

The following is an example of a six week programme combining all aspects of cardiorespiratory endurance recommended by the British Army. You can visit the [Army Fitness Guides](#) website published by the Guardian newspaper for further details.

	Session 1	Session 2	Session 3	Session 4
Week 1	15min warm-up 6 x 200m hill repeats (jog back down between each) 15min cool-down	Steady run for 30-40min	Fartlek session: off-road 30min	Slow, steady run for 45min
Week 2	15min warm-up 6 x 200m hill repeats (jog back down between each) 15min cool-down	Steady run for 30-40min	Fartlek session: off-road 35min	Slow, steady run for 50min
Week 3	15min warm-up 8 x 200m hill repeats (jog back down between each) 15min cool-down	Steady run for 35-45min	Threshold training: 4 x 5min with 2min recovery between each	Slow, steady run for 50min
Week 4	Fartlek session: off-road 40min	Steady run for 35-45min	Threshold training: 4 x 5min with 2min recovery between each	Slow, steady run for 55min
Week 5	Threshold training: 4 x 6min with 2min recovery between each	Steady run for 40-45min	10min warm-up Interval training: 8-10 x 60sec hard running, 60sec jog	Low-impact alternative to running such as rowing, cycling or swimming:

	Session 1	Session 2	Session 3	Session 4
			recoveries 5min cool-down	45 min-1 hour
Week 6	Threshold training: 3 x 8min with 2min recovery between each	Steady run for 40-45min	10min warm-up Interval training: 8-10 x 60sec hard running, 60sec jog recoveries 5min cool-down	Slow, steady run for 1 hour

Cool down phase

Low intensity exercise

The cool down phase of your workout is important. Gradually decreasing the intensity of your running, cycling, rowing or swimming to a slow pace has the following benefits: a) it disperses lactic acid that has accumulated in your muscles during exercise; b) it allows blood that has been diverted into your legs during exercise to return to the central circulation and so prevents blood pooling in your lower limbs which can lead to dizziness and fainting if you stop vigorous exercise suddenly; c) it allows your heart rate and temperature to return to normal levels.

Post workout stretching

Following a cardiorespiratory workout, you should do lower body passive stretching exercises, including quadriceps, calf, hip flexor, hamstring and gluteal stretches.

Post work-out hydration and nutrition

Performing vigorous cardiorespiratory exercise is thirsty work. Make sure you drink little and often during your workout, as even a 2% fall in body weight from fluid loss can severely affect your running performance. After you finish the conditioning phase of your workout, you should consume a carbohydrate rich food or drink to replenish your muscles' glycogen stores. Don't wait until you've done your stretching and taken a shower otherwise you won't get the full benefits of this nutritional advice. The amount that you should consume after exercise is about 1 gram of carbohydrate per kilogram of your body weight.