

Endurance Training Session

Notes to accompany Slide Show

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About Graham Rafferty

I was born in Coventry in 1956. I started running in 1964 with my father who was a football referee. He trained twice a week. I ran competitively for Coventry Schools and Coventry Godiva Harriers at Cross Country. However, I would have called myself as no better than "Above Average". I lapsed after college but picked up again in my 30s, again, average for my age. I lived in Dubai for the last 21 years where I headed up a running club. For much of that time I was injury hit (Shin Splints) and going downhill with my running.

In 2011 a chance meeting with a coach based in South Africa changed my life in a dramatic way. The shin splints disappeared, my times improved and I progressed from below average for my age to finishing 4th for age in the marathon at the World Masters athletics in Perth Australia in 2016. I made the podium as the part of the British team who took the silver medal.

My best times over the last 5 years are. 5k 19:15. 10k 40:05, HM 1:27:46, Mar 3:07:37

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Objectives:

The objectives of this session are:

- To improve your marathon race time by between 10% and 20%. (20 to 40 minutes)
- Improve base fitness.
- Reduce injury rate
- Reduce fatigue

- I have used this training plan for the past 6 years in Dubai taking well over a 100 runners to a pb.

Improvement to endurance fitness is about using the correct techniques. It is not about hard work. “No pain, no gain” is replaced by “Train, don’t strain”

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A marathon has two finish lines. The official finish line which is at 42.2 km and the unofficial line which is known as the “hitting the wall” and occurs somewhere after 30km. Although you may carry on to finish the marathon after hitting the wall, your dreams of hitting your target time are all over. The Americans use the term “Bonking” for hitting the wall. But when I tried downloading images for “Bonking” all I got was this “CENSORED”

Hitting the wall has nothing to do with getting it wrong on the day and everything to do with training. You may think that you didn’t train hard enough, but often it is due to training too hard with the wrong techniques.

The objective of the training is to get you to “Finish the race before the race finishes you”

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Endurance training.

There are many terms used to describe endurance training. For example.

- Base Training
- Long Slow Distance
- Aerobic
- Low Heart Rate
- Fat Burning
- Low Intensity

I prefer the term “Base Training” as it conveys the right meaning. It the base on which you build up your performance times, at any distance.

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The origins of base training go back more than a hundred years.

Arthur Newton is credited with discovering the technique. He was British but brought up in Rhodesia (Now Zimbabwe). He took up Ultra Running late in life (aged 40). Initially he thought that the best way to training was to set out fast and see how long he could keep going. This proved to be disastrous. He ended up fatigued after each session. One day he collapsed and decided that this wasn’t the right approach.

He decided to reverse the process and train slow. It paid off. He:

- Won the 90km Comrades Marathon 5 times between 1922 and 1927
- Lowered the course record from 8:59:00 to 6:24:45
- Broke the world 100 mile record twice

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Arthur Newton had some great quotes.

- Train slow content in the knowledge that you can run faster when you need to
- Better a slow 3 hour run than a fast 2 hours
- Never race until you have to.

Back in August I was on a training run with Chris Lamb, Chris Cook and a few others. We ran to Netley and back. On the way back Chris Lamb and I were engaging in conversation. Our paced quickened. As we were approaching the common Chris started to push the pace. I think that he was testing me. I decided to back off, remembering that this was a training run not a race.

All too often we turn training sessions into races instead of sticking to the correct pace. (This applies to LRR Monday and Wednesday sessions too)

Back Ground Reading:

Running for their lives. Mark Whitaker

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This all sounds good but how does relate to my target of breaking 19 minutes for a Park Run?

There are only 8 individual running Gold Medals in the Olympics. 100m, 200m, 400m, 800m, 1500m, 5000m, 10,000m and Marathon. In the last two Olympics Mo Farah and Usain Bolt have pick up half of them.

Usain Bolt is a giant of a man, weighs 94kg, height 1.95m, giving him a BMI (Body Mass Index) of 24.7. (Almost over weight), the ideal build for a sprinter.

Mo Farah is a small in stature, weighs 60kg, height 1.75m, giving him a BMI of 19.7, the Ideal build for an endurance runner.

My build clearly puts me in the endurance side. Whilst I may not be in the same league as Mo Farah, 30 years ago I was faster than him! Admittedly he was only 4 years old at the time. I do have a faster marathon time than Usain Bolt.

The question is "Where does sprinting stop and endurance take over?"

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New Zealand Coach Arthur Lydiard clearly established where endurance events start 60 years ago with his prodigy Peter Snell. Arthur Lydiard introduced the concept of “Periodised Training”. This involved months of base training with no speed work. He made Peter Snell run 180 km a week.

He only allowed speed training to commence 6 weeks prior to the track season. Peter Snell won 800m Gold at both the 1960 and the 1964 Olympics.

In 1962 he set a world record for 800m, 1:44.3, on a grass track! 57 years later it remains the New Zealand National record.

I asked one of our members if they would be joining my sessions and the reply was “No. My focus for 2019 is to get my Park Run pb below 19 minutes” She ticked that box last Saturday so I now look forward to her joining the sessions.

Although we are structuring the sessions around London / Southampton marathons, the benefits of base training cover all endurance distances from 800m upwards. If runners want to drop in and out of sessions that is perfectly ok.

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- Charlie Spedding is the fastest English born Marathon runner ever. He set that record (2:08:33) in 1985. In his training log he described 3 out every 4 training sessions as “Easy Pace”. By “Easy Pace” he meant 6 minute miles! Doesn’t sound like easy for us, but it was 20% slower than his marathon race pace, 5:00 / mile. If your target is to break 3:30 for a marathon then your race pace needs to be 5:00 / km and training pace 6:00 / km. That means 80% of training hours at 6:00 / km.
- Philip Maffetone, a sports scientist, developed the theory of setting training intensity to heart rate. He set a target for base training as heart rate maximum should be 180 – your age.
 - Add 5 bpm if you are experienced in base training.
 - Deduct 5 bpm if you are a beginner to base training or returning from injury.

In my training for Budapest Marathon in October I did at least 3 long runs a week over a period of 4 months at a maximum heart rate of 120 bpm

- Matt Fitzgerald, an author of many books on running argues that 80% of training done by the top athletes (by time) is base training.
- Mark Sissons, a former Ironman Champion, advises that there should be long periods of out of season base training followed by maximum of 4 weeks of high intensity, and then a return to base training.

Background reading

From last to first. Charlie Spedding

The Maffetone Method. Philip Maffetone

80/20 Running: Run Stronger and Race Faster By Training Slower Matt Fitzgerald

Primal Endurance. Mark Sisson

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VO2 max v Running economy

There are two important measures of fitness, VO2 Max and running economy.

If I was comparing these measure with a car then VO2 would equate to the size of the engine. It is the amount of power you can deliver. It is measured in units of millilitres of oxygen uptake per minute per a kg of body mass. Top athletes have a VO2 max of around 90. Starting point is hereditary. Paula Radcliff was found to have a very high VO2 Max when she was in her teens. VO2 Max is enhanced with speed training. If you wear a Garmin heart rate monitor you can get a report on of your current VO2 Max. Mine is 64.

Running economy is like the aspects of a car which ensure that maximum advantage is taken from the power of the engine. For example, efficiency of the transmission system, Mass of the car, Wheel alignment, Tyre pressure, Aerodynamics and Lubrication.

Kenyan athletes have no advantage over Europeans in VO2 Max, but they outperform in running economy. My own theory is that this comes from having had to run miles to and from school each day from the age of 8.

Imagine that you are a new runner and you set off for your first run. You manage a km and collapse at the nearest lamp post. A week later you try again, determined to get one lamp post further. This goes on for a few weeks and you find yourself being able to run twice a week. Eventually you do your first park run.

One day you are out running and you spot a group of runners warming up. Some one calls out "Hey why don't you join us. We are Lordshill Road Runners..... Group G." You're hesitant at first but then your eyes focus in on an elderly guy with grey hair. It happens to be Alan Graham. You think that if he can keep up the pace can't be that bad.

You set off. It feels ok to begin with, but by 2 km you are starting to breath heavily. Everyone else is chatting away. Someone calls out "You OK back there?" "Yes" you gasp. The pack starts to pull away. To your relief they stop at a corner. As you catch up a voice calls out "Still Ok?" and they start running again. Somehow you make it to the end and you start thinking. "If that's the standard of Group G what the hell is the A team like?"

The main difference between the new runner and the experience runners is not in speed, but running economy. No doubt the new runner was burning up far more calories than the trained runners.

Running economy is:

1. To run at the same pace using less effort (Energy , Calories).
2. To run faster with the same effort

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How does base training work.

We have three types of muscle fibres, Type 1 often called slow twitch. Type 2a, fast twitch and Type 2b super fast twitch. Type 1 are used at low intensity requirements, everyday routine activities. Type 2a are used when sustain periods of higher intensity are required (running). Type 2b are used for very short periods of high intensity (weight lifting and sprinting).

The muscles fibres access different sources of stored energy. Type 2 muscles use CP and Glycogen (made from Carbohydrates). The store of CP will only support activity for up to 10 seconds. Glycogen, stored in the muscles and liver has a supply of approx 2200 Kcal. The problem is that this isn't enough to get you through a marathon. When it runs out, you hit the wall. You cannot add much to the glycogen store during a marathon as the liver can only convert Carbohydrates to Glycogen at the rate of approx 200Kcal an hour. Any attempt to increase the amount of glycogen available results in a rise in blood sugar levels. The pancreas reacts by releasing insulin which converts the blood sugar to fat.

To avoid hitting the wall the brain has to be trained to use slow twitch muscles which use the abundance of body fat available (triglycerides)

LRR sessions on Monday and Tuesday are developing the Type 2 muscle fibres and improving VO2 max.

Endurance training develops the Type 1 muscle fibres by training at low intensity.

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In the summer of 2012 I underwent a test at a clinic in Dubai. I was placed on a treadmill and had to run at 8km / hour. Every 2 minutes the speed was increased by 1km / hour up to 15 km / hour. At each speed my usage of the energy store was analysed. At 8km / hour I was getting just over half of my fuel from carbohydrates (glycogen). As the intensity increased I was burning 100% Carbohydrates by 14 km / hour. This is known as the anaerobic zone. Clearly I would struggle to complete a marathon at anything under 4 hours without hitting the wall.

I was put on a regime of running for months at low intensity, heart rate at less than 111 bpm. To maintain this I would have to run as slow as 7 min / km.

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I repeated the test 9 months later. At 8km / hour I was now burning 100% fat. At 14km / hour I was still burning fat and over all energy consumption at this pace had dropped from 880 Kcal / hour to 680 Kcal / hour. I could now run a marathon much faster and not hit the wall, which I did.

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The improvement in performance over a range of distances at the same events was dramatic after I started the low intensity training. The first column in the chart shows my performances before the base training, the second column shows the same events a year after the base training. The marathon time of 3:25 qualified me for Boston. The time a year later, 3:13, got me a good for age entry for Chicago, New York and London. I set out to run all 6 marathon majors over a three year period (Japan and Tokyo are the other two).

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Losing weight is a great way to improve race times. For each kg of body mass lost, you shave 3 seconds off a km. 10kg reduction in weight equates to 5minutes off your 10km race time. Base training helps to reduce weight because it eats into your fat store. High intensity training only consumes Glycogen which is replaced as soon as you eat more carbohydrates.

Weight loss is a welcome effect of base training, but must never become a target. It is very dangerous to try to reduce to weight to a "Target Race Weight". Some athletes doing this have actually found that they perform better when they put weight back on. A top American runner improved her pb by putting on 5kg.

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Diet.

Fat and protein are essential for your diet for energy source, hormones and muscle repair. Carbohydrates have no nutritional value and it is possible to eliminate them from your diet. Your body can still produce glycogen by a process known as Ketosis.

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Data from the test done on myself show that for 22 hours a day I am using the fat store only as an energy source, even doing aerobic work in the gym. I access the glycogen source when I run, but during a 24 hour period only around 20% of my energy requirements are met by burning carbohydrates.

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We need to avoid foods with a high glycogen index as these will cause a blood sugar spike which then gets converted to fat by the release of insulin.

Such foods are:

Avoid

Potatoes, confectionary, pastry, pasta, pizza, white rice, bread (particularly white), cereals, anything containing added sugar, foods labelled as low or reduced fat, micro wave meals, ready meals etc.

Processed foods such as vegetable oil, sun flower oil, margarine, easy spread butter,

Reduced Fat foods often have sugar added to give them taste. They, exist on the non-proven theory that fat is bad for the diet and Carbs good.

Good foods

Sweet Potatoes, dark chocolate, fresh green vegetables, fresh fruit, meat, fish, nuts, dried fruit, dates, olives, avocado, cheese, eggs, natural Greek Yogurt.

Pure butter (grass fed eg Kerry Gold), extra virgin olive oil, avocado oil, coconut oil.

My wife has produced a selection of low carbohydrate recipes which we will make available via the internet. She has also made the protein balls for tonight's session (at a third of the price of buying them in the shops).

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Background Reading

The Real Meal Revolution. Prof Tim Noakes

The 8-week Blood Sugar Diet: Lose weight fast and reprogram your body. Michael Mosley

Primal Endurance: Escape chronic cardio and carbohydrate dependency and become a fat burning beast! Matt Sisson

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Running style.

The girl in the picture is over striding. Her heel is about to strike the ground with her leg out straight.

She is trying to outrun a bunch of fast Kenyan Athletes. In doing so she has lost control of her running style.

The Kenyans are striking the ground with the toe pointing to the ground and the knee flexed.

Gordon Pirie, who set a world record for the 5000m in 1955, had a superb, running style with a short fast stride. His views were:

“Foot should hit the ground with a mid-foot strike, directly under the body, with a flexed knee.”

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Gordon Pirie's world record for 5000m in 1955, 13:36 was 5 seconds faster than Mo Farah's winning time at the London Olympics. Pirie's time was set on a cinder track like the one in the picture.

He did an extremely high volume of training and ran with high cadence and short strides giving him excellent running economy.

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The slide shows a picture of me in the last km of London Marathon with good running style apart from leaning forward a little. The second picture shows my running style from 15 years ago,

Good running style requires hours of practice at base pace. Speed training gives limited opportunity for improving style. Core muscle work as in the Tuesday strength and conditioning sessions, is essential for balancing the body, improving running style and injury avoidance.

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Running shoes. Bruce Tulloh, who was a member of Portsmouth ac, had fantastic running style. In 1962 he won the 500m European Gold running bare foot!

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A lot of experts preach running in light weight flexible shoes. For example:

- Gordon Pirie. Running fast and injury free.
 - Buy the lightest flattest shoes you can find with no arch supports.
- Danny Dreyer, athletics coach. Advocates a running style known as Chi Running
 - Find the lightest most flexible shoes that suit you. Then buy up the whole stock because in six months time the style will dropped.
- Adharanand Finn, sports journalist and Author of the book. "Running with the Kenyans."
 - Most children in Kenya raced bare foot. The few with shoes were often at the back. Ironically the prize for winning a race was a pair of new running shoes.
- Peter Larson writer. Tread lightly.
 - Wear light weight running shoes which allow you to run lightly.
- Christopher McDougall. Author who wrote "Born to run"
 - Advocates minimalist shoe or barefoot for the most natural injury free running style.

A reduction of 100g in weight of shoe is as effective as a reduction of 1kg of body mass. My running shoe weighs 200g, is a racing flat, has little cushioning and has a very flexible sole. I bought up 6 pairs in 2014 when they were being withdrawn from production. In theory by running barefoot I can save 400g in weight which translates to 12 seconds per km, two minutes over 10km. That would amount to 5% improvement at the cost of nothing. Nike Fly claim a 4% improvement at the cost of \$500.

Running shoes will not correct running style. But can often prevent good running style. The most expensive are often not the best.

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Picture is taken from Dubai Marathon 2015. The girl in black, Gerda Steyn, had recently joined out club and was new to running. She clocked 3:12 that day. She is now South Africa's top endurance runner have won the prestigious 56km Two Oceans race last March and clocking 2:30:04 at New York marathon. That's the fastest marathon time by a South African for nearly a decade and would have ranked her second female in the UK for 2018.

To avoid injury, Gerda does more than half her training on a bike or pool jogging.

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Meb Keflezighi, won Boston Marathon 2014 aged 39. He was the first American winner for 33 years. The previous year the event was hit by terrorist bombs. The organisers were desperate for 2014 to be something special. Meb was a hero and was named as American Athlete of the year for 2014

He does half of his training on an ElliptiGO , a cross training that you can take on the road.

Cross training is a great way to reduce injury risk,

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Injuries are of two basic forms, acute and over usage. Acute injuries are in the form of sudden tears. They are of particular risk to runners doing high intensity training. But they can also occur during base training if, for example, you accidentally step on the edge of a kerb.

Over usage injuries (non running examples are house maid's knee, tennis elbow, writer's cramp) are associated with the increase in volume of base training.

Avoidance

- Warm up well before speed training.
- Rest.
- Cross training.
- Vary the surface you train on, example run cross country.
- Include undulating terrain.
- Avoid running on a road with a camber,
- Balance the body with weight training and gym work

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Many runners don't think they can improve because they are not cut out for running. The first picture shows a runner from my club in Dubai, called Michael Jackson, before he took up running in 2006. The second picture is the same guy in 2012. We has since run the 90km Comrades Marathon in South Africa.

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A lot of runners are put off sport because they were not very good at school. The chart shows the top 30 most capped English football players grouped by month of birth. There is a clear bias towards the ones born in the months from September to December. This is because physical development of children is large in the course of a year. The ones born in the early part of the school year have a big physical advantage over the ones born in the last 4 months. As a result they are the ones who excel at sport and make the school team / local schools team. By the age of 12 they are already being picked up by the top football clubs.

Background reading

From Last to First. Charlie Spedding (he finished last in a race on school sports day but went on to get a marathon bronze in the 1984 Olympics)

The Outliers. Malcolm Gladwell (A journalis / author whose book highlighted how advantage of circumstance gives you a head start in life.)

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I'm too old.

You are never too old to get started. The first picture shows a 100 year old marathon runner who visited our club in Dubai. We ran 10km, but very slowly, I was beginning to wish that I had taken a packed lunch

Steve Way from Bournemouth started running at the age of 33. At the time he was a heavy smoker and drinker. He was over weight.

Aged 40 he entered London Marathon in 2014 as a warm up for an Ultra event and finished 3rd English runner This qualified for the Commonwealth games and he also broke Ron Hill's long standing veterans record. His best achievement was Finishing 3rd in last year's Comrades 90 km Ultra event.

In the words of the late British actress, "You don't stop when you get old, you get old when you stop." Many health factors that were thought to be due to the aging process are now proved to be due to in activity.

Back ground reading

Fast after 50. Joe Friel. (I'm waiting for the sequel, fast after 60)

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Planning your life

Before you begin to plan your training you need to plan your life. We have to make time for work, family and social life. Work and family bring with them stress. Children bring a lot of stress. Just when you think you're finished with that you start getting the stress from aging parents, which is

many times worse. Our social life, which includes running is supposed to be our stress relief valve. Don't get stressed out about running.

Some guidelines to managing stress are:

- Make running part of your routine. Even though I'm required I find that by sticking to an exercise routine it helps both myself and Katrina manage our lives.
 - Be prepared to miss a session if needed, Family birthdays, visiting relatives, spouse wants to go to the theatre, school parents evening all need to be accommodated otherwise your training will add to the stress.
- Running 3 x 2 hours a week is better than 6 x 1 hour. If it suits you to run for longer but less frequently then that's a good approach
- Stuff happens. Injury, family bereavement, illness, etc. Take a week out from training if you need to and write it off.
- Remember that it is better to be 10% under trained than 2% over trained.

We run for pleasure. You may be racing with a non drinking friend and hence you get his beer too at the end of Chicago Marathon.

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The slide shows Coburn and Frerichs of the US finishing 1st and 2nd in the 3000m Steeple Chase at the World Championships in 2017. It was a huge shock as there were 6 Kenyans in the final (3 official entries, one invited back as reigning champion and two representing Bahrain and Qatar) and everyone was expecting a clean sweep for the Kenyans.

In the previous May, Coburn had not performed well in a race. When quizzed by the press her comment was "The World Championships aren't until August"

You cannot race your best every week. You have to choose two or three target races for the year. You then plan your base training period, speed sessions, taper periods and recovery periods to maximise performance for the target races. Be prepared to run below par for other events.

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Choosing your marathon target time.

This can be derived from your best (recent) 10km time or your half marathon time. As a rough guide, take your 10 km race pace and add 15 seconds per km to get your HM race pace. Add a further 15 seconds per km to get your target marathon race pace. For example.

10km time is 40 minutes, pace is 4:00 / km hence Half Marathon pace should be 4:15 / km (1:29:40 for half marathon). Your marathon target pace is then 4:30 / km giving a target time of 3:09:54.

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Training plan.

The plan covers only two sessions a week with advice on what to do for the remaining training hours.

The Long Slow Distance runs.

Sunday. 8:30 am.

Sainsbury's Lordshill Shopping Centre

This is a good start location for running on the quiet country lanes between Rownhams and North Baddesley. There is ample parking place and toilets available in Sainsbury's. Also a cafe for a social chat after the run. The sessions need to be at even effort so the planned routes will aim to avoid steep hills (including something like the Avenue of Pain in a LSD run totally negates the purpose of the session)

To accommodate runners who are not planning a marathon we will divide the session into two loops. The first loop will be no longer than 90 minutes. The second loop will take us up to the desired time for the session.

All durations are in terms of time. Pace is as per the schedule and has just 4 settings.

P1 is target marathon race pace plus 1:15 / Km. Very slow pace.

P2 is target marathon race pace plus 1:00 / Km. Recommended pace for base training.

P3 is target marathon race pace.

P4 is target Half Marathon race pace.

The plan begins with 3 sessions at pace P1

The rest of the sessions are at P2.

With 8 weeks to go the sessions start a pace P2 and finish at Pace P3.

6 weeks to go we do the Fleet Half Marathon (Sunday).

From now on the sessions get shorter, but with a larger portion at Marathon Pace.

It is important that the sessions are executed none stop. If you need a rest then you are training too fast.

Additional training hours can be cross training or running, but keep the intensity low.

Tempo Intervals

Thursday, 6:30 pm (Commencing 24th January)

Sports Centre 400m track

Sessions are to marathon or half marathon race pace. First session is easy, 3 x 2.4 km at P3 (Marathon Pace). The longest session, with 4 weeks to go until marathon day is 5 x 3.2 km.

It is very important to stick to pace hence the reason for doing is on the track. I usually set my Garmin to alarm when we should complete a lap. For example 3.2km is 8 laps of the track. At 4:30 / km that should be 1:48 / lap. So I program the Garmin for 3 x (8 intervals of 1:48 plus rest on lap button press). The recovery is 800m at pace P2.

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- To get a good marathon time, speed training is not necessary.
- One session a week is ok
- More than one session adversely affects the base training process.
- More time spent on high intensity training means less time available for base training.
- A weekend race counts as a fast training session

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Some dos and don'ts

- Don't deviate from the plan.
- Stick to pace, stick to duration.
- Don't run if you feel ill, tired or run down. Rest is best.
- Don't get side tracked by advice from others or by Social Media.
- Don't do any race which exceeds 10 miles in the last 5 weekends before the marathon
- Don't race in the last two weekends before the marathon.

I'm not going to tell you not to race. Lucy and Chris would kill me. But don't lose track of your goal.