



# **RUNNER'S MANUAL**



**Brian Schepisi**

The ***Sporting Spirit Runner's Manual*** has been written and developed by Brian Schepisi. Read this manual carefully as it contains valuable tips that will make your running journey much easier...and hopefully more rewarding. We highly recommend that you keep an accurate training diary. This will help you to learn about your body and how training affects your performance.

Good luck and enjoy your running!

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**For information on Sporting Spirit running programs**  
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or visit our web site [www.sportingspirit.com.au](http://www.sportingspirit.com.au)

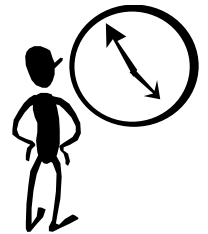


# Goal Setting & Planning

If you want to be a better runner you must decide how much better you want to be and then start working towards it. Any person, no matter how old or unfit can improve to a significant degree over time. You simply need to be clear about what you want to achieve. Follow the guidelines below and you will succeed.

## Set Goals

- Determine what event(s) you wish to compete in (eg Marathon, 10km). What time would you like to finish in? Be specific about what you want.
- Set long term goals eg. Break 3hrs for the marathon in two years time. Set medium term goals eg. Run 3hrs 20min in the marathon in 6months time. Use the Race Estimate charts (back pages) to assess what times you should be aiming for over various distances in order to achieve your ultimate goal.
- What date is your main goal? How many months or years have you got to prepare? All plans must have deadlines otherwise you will wander off course and never achieve it. Write down your goals, otherwise they're just dreams.
- Believe in your ability to achieve your goal. If you don't believe you can do it, you probably won't! Set an easier goal first. One that is still a challenge, but that you are confident of achieving. Then go the next step to an even bigger challenge. You must be totally committed to your goal once you set it. Don't take the easy way out. Who ever heard of doing something easy that was still rewarding?
- Seek coach's advice & talk to other runners who have already been successful with their goals.



## Assess where you are now

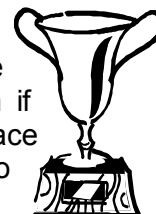
- What training are you currently doing? Mileage, runs per week, months or years experience?
- How fast do you currently run? What endurance do you have? Time trial or race 5 & 10k etc Ask your coach "I run 10km in 50min now, but I want to run it in 45min. How long will it take to train up to this level?"
- Injury status- Have you got an injury that will affect your training for a lengthy period of time?
- How is your strength? Hard training requires a strong body. A strong athlete will get fewer injuries than a weaker one. Two weekly strength training sessions will give any runner an advantage.

## Determine what needs to be done

- Seek your coach's advice, read or talk to others who are successful (be careful, don't just copy what someone else does).
- Set short/medium term goals eg. Increase runs from 4 runs per week to 5 runs, build long run to 20km by the end of winter, run the Sussan 10k Classic in 45min, compete regularly in cross country races.
- Follow a specific training program to help you reach your goals. Make sure it's the right standard for you. Train with others of equal or slightly more ability than yourself.
- Be patient, fast gains are lost more quickly and have higher risk of injury.
- Runners who have always been active eg. Football, cross-country etc. can cope better with increases in training.

## Race Planning

- When you have a race coming up decide before hand how you will run it. Is it a training race or a major goal race for you? If it's a training race don't try to break the world record. You should have a target time set that is a stepping stone towards achieving your main goal. Learn from the race and it's outcome. It will reveal some strengths and weaknesses in your running which you can work on in training. Remember to save your best effort for your major goal race.
- What will your pace strategy be? Run an even pace for the whole race, or do you want to run quicker over the last stages of the run?
- In a Marathon aim to run at an even pace, but in setting a goal time allow for a 2-3min drop off in the last 10-15km. Use the Marathon pacing chart (**back pages**) to calculate your 5km splits.
- For 5-10k races you can run an even pace (**see 5-10k pace chart- back pages**) or you may choose to run quicker through the final 1-2km which can be a good strategy.
- Heat, wind, cold and hills will affect your pace so make allowances. Plan, write down and practice what you will do in these situations. Eg. Drink every 10min if conditions are warm, run the hills strongly but conserve some energy for a faster pace over flatter sections of the course and finally tuck in behind two or three runners to shelter from the wind.



## Types of Runs in a balanced Program

### Aerobic Conditioning

#### The Long Run - intensity E2 (70-80% of MHR- **see sheet A**)

The long run is an extremely important part of a runners training week. It helps prepare the body for harder sessions of running by strengthening muscles, tendons and ligaments. It also brings about the adaptation of increased fuel storage (glycogen) in the working muscles and greatly improves the bodies' ability to utilize fat necessary for prolonged exertion. This occurs because the heart, lungs, capillaries and cells (mitochondria) increase their ability to transport and utilize large amounts of oxygen. The removal of bi-products such as carbon dioxide and lactic acid also becomes more efficient. All these physical adaptations lead to greater efficiency and improved overall fitness.



A 10k runner should run up to 15km (18-20k if advanced) for a long run, while marathoners should build to 2½-3hr hrs (30-34 km). The long run should be done once a week or once every 2nd week if you are less conditioned to regular long runs and need more recovery time. An advanced runner will need to do a second long run on a Wednesday, but not quite as long as Sundays run.

The pace of the long run is generally relaxed at 45-60 seconds p/km slower than your 10km race pace (70% - 80% of max Heart Rate). Although pace practice (Half marathon or marathon pace) is important also. If you run too strong on your long runs you will be too tired to do any speed work during the week. Hills, walking trails, dirt roads, grass etc. are ideal for long runs, but you should also run on flat courses similar to your marathon course, especially for pace practice. Avoid overdoing your runs on concrete or asphalt as this will lead to injury.

**Build your long run up gradually!** Don't increase it by more than 10 min at a time. If you are new to running you must first develop a regular routine of 3 -4 runs p/week of 20 -40 minutes. You will need to keep this up for at least 3 months before you begin to build your long run. When you start to increase this run, do so gradually (5-10% p/week). If you are a beginner it is a good idea to include walking breaks during your long run if your heart rate climbs too high. Pretty soon your fitness will improve and walking will no longer be necessary.

## Medium-easy runs- Intensity E1 (60-70%) E2 (70-80%)

These runs are the foundation of all running programs. As per the long run their purpose is to improve your aerobic fitness and to help prepare the body for harder runs. Easier recovery runs must follow harder training days; otherwise you will become susceptible to injury. You cannot do a quality session if you ran hard the day before. Runners who ignore this and run too strong on the days in between the planned interval training, tempo runs etc. will not be able to meet the demands of those sessions. Advanced runners run easy recovery runs (30-40min) in the mornings while focusing on longer sessions and speed work in the evenings or afternoons. This enables them to build an extensive aerobic base.

## Anaerobic Threshold (Tempo Runs) - Intensity-E3-4 (80-90%)

This type of running is best described as steady and strong but not so quick that lactic acid will accumulate in high quantities. Your heart rate will be around 85% of max with a harder tempo run at closer to 90% (close to your 10k race pace). These runs are typically about 30-40min or up to 60min if your long run is well developed (2hr). Your Anaerobic Threshold (AT) is a level of exertion where although you are working hard, your muscles are mainly relying on the aerobic energy system (fat/oxygen) to do their work. The build up of lactic acid in the body is kept below a certain 'threshold', which is important for long hard runs such as the marathon. Increase your exertion beyond this level and your muscles will have to rely more on the anaerobic system with greatly increased glycogen usage and a higher accumulation of lactic acid. By improving your Anaerobic Threshold you increase the speed at which you can run over long distances. This is mainly due to increased aerobic efficiency. A weekly AT run is important, with two sessions advisable for more advanced runners in early base training periods. Races that help improve AT are 8-10k events or 5k for beginners.

## VO2 Max - Maximal Oxygen Uptake - Intensity-E5 (92-97%)

The maximum amount of oxygen (measured in litres p/min) your body can utilize during exercise is called your VO2 Max. Aerobic training such as distance running will greatly improve a runners VO2 max. To fully develop this part of your fitness you need to run at a pace that will maximally tax your aerobic energy system. Lactic acid does accumulate steadily, making these very hard runs. A 3k time trial will give you a good indication of your VO2 max fitness. Fast continuous runs over a 15-20min period or long repetitions 2-5min duration (x4-6) are the main types of workouts. This level of intensity should only be introduced when a solid base of running has been developed which includes long runs and AT runs.



## Anaerobic Energy Supply- Speed Endurance

### Lactic Acid Tolerance- Intensity measured by pace not HR

Fast, sustained efforts longer than 10sec and less than 2min require very large amounts of energy, which is supplied by the anaerobic energy system (without oxygen). The breakdown of muscle glycogen provides this energy with lactic acid being produced as a result. The build up of lactic acid causes muscle fatigue and gives the athlete a queasy, sick feeling. Interval training that involves repeats of fast running over 200-600m will increase a runners ability to tolerate large build ups of lactic acid. Strength and running efficiency also improve. This sort of training is very demanding and must be introduced gradually and with thorough preparation.

### Phosphate Energy- Short Maximal Speed

Sprinting up to 10sec relies on the anaerobic-alactic energy system. It doesn't require oxygen, fat or glycogen and no lactic acid is produced, Instead the energy is supplied by the breakdown of a small amount of Adenosine Triphosphate (ATP) and a high energy substance called creatine phosphate already in the muscle cells. Once creatine phosphate has been depleted it must be replenished by resting for at least 3min.

**Ref:** Martin, D. E. & Coe, P. N. (1997) *Better Training for Distance Runners*, Human Kinetics, SA

# Running Drills

## Development of Running Technique and Power

Running drills improve running technique and therefore speed and efficiency. These drills use the principals of plyometrics. Plyometric exercises improve the stretch reflex of a muscle. It gives the muscle the ability to contract very fast immediately following an eccentric stretch. In running if the leg muscles such as the calves, quads & hamstrings contract faster and more explosively, speed will naturally follow.

The force that is exerted on the muscles in drills and plyometric exercises can be considerable depending on the degree of difficulty. Therefore strength development using weights is recommended to help prevent injury and to maximize your power.

### Marching

#### Marching with skip (option to extend to straight leg)

**Side Glides** - toes up, arms by side, look straight ahead.

**Patter run**- light, quick action, pitter-patter

**Straight Leg Shuffle** - stiff legs

**Backwards Running** - upright body, heels toward butt, high knees

**Butt Kicks** - with jog/patter run, quick snap, don't break rythm

**High Knees** – step over ankle of support leg, swing arms (beginner- half height only)

**Claws**- in place, single leg, hold onto fence.

**Hopping** - in place, double foot contact, toes up, stiff legs

#### Carioca or Side Step overs

**Hops/alternating** - big leap, drive knee up, swing arms, fast short ground contact

**Fast Claws** - combine fast knee with butt kicks, with patter run

**Fast Knees/step over**- with patter run/jog, alternate or isolate r/l legs.

**Bounds - high knee** drive, foot contacts under body, toes up, extend rear leg.

**Running drill** workouts should be done 1-2x p/week- Warm up and stretch before hand. Do these exercises on a forgiving surface like grass, dirt, matting etc. **never on concrete!** Beginners should start with easier low impact drills- 20-25m. Intermediate runners- medium impact over 30-40m & advanced runners 50m max. Stop drills if tired or feeling tight or strains. Build up very gradually and be consistant each week. Drills performed irregularly will lead to injury. When performing drills think light, fast and springy!

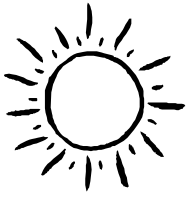


### Further Study:

Coaching Speed Video- Drills, technique for running- Available from the Australian Track & Field coaches Association

# Fluid intake... don't boil your radiator!

This article was written by Brian Schepisi for Runner's World magazine.



Summer is upon us, and once again parks and beaches are buzzing with people out jogging and walking. As a coach in Melbourne I always look forward to the warmer weather and longer days. Not that I don't appreciate all the seasons, it's just that cold and wet weather isn't great for business when you coach outdoor sports like running and triathlon. Summer however does present a risk to runners, coaches and event organizers as the mercury begins to climb. In a not so serious case a runner may have to deal with a nasty dose of sunburn, a disappointing

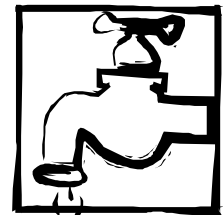
slow finish to a race, and perhaps a headache later that evening, but in a worse scenario the health risks are far greater.

Many people recall Chris Leigh's struggle in the final stages of the 1997 Hawaii Ironman where he collapsed from heat stroke. Michelle Brown, editor of *Australian Triathlete* magazine was in Hawaii covering the event at the time. She remembers Chris being in trouble early after the swim leg with vomiting and stomach cramps (warning signs of dehydration). Chris pushed on for several hours but collapsed only 100m from the finish line after running the final 42km in 40-degree temperatures. The next day he had an operation to remove a section of his small intestine, which had 'died' due to a total shut down of his bodies, heat regulation capacity. Basically, he cooked inside.

No, this is not meant to scare you into giving up running during summer in preference to sitting on an exercise bike in an air-conditioned gymnasium, but it should make you aware of some of the medical risks.

## Why should I drink?

Our bodies need to be well hydrated in order function. A car cannot run with an empty radiator and neither can we. Our muscles are 75% water and a loss of just 2% (1.4kg or about 1 1/2 litres in a 70 kg person) of fluid through sweat and metabolic activity during exercise will negatively affect performance and health. A combination of heat dissipation from the blood circulating nears the surface of the skin and the cooling effect of sweat evaporation makes for very effective heat regulation. If dehydration continues unchecked, blood plasma volume drops and the body begins to reduce blood circulation at the skin surface, preferring instead to supply major working muscles. Combine this with sweat reduction (and eventual cessation) as diminishing fluid levels are conserved, and the body no longer has the means with which to cool itself.



The effects of dehydration on exercise performance are totally relative to the degree of water loss. The more you lose the greater the cost. Early symptoms include increased heart rate (5-10 beats higher than expected for a given effort level), muscle cramps caused by loss of sodium, fatigue, light-headedness, and feeling thirsty. More serious signs that heat stress is turning into heat exhaustion are nausea, vomiting, loss of coordination and finally unconsciousness (heat stroke).

## What should I drink?

So how can a runner adapt to summer conditions? First and foremost you should always be well hydrated before, during and after training or racing. Problems are more likely to arise if you are already dehydrated before you start exercise, so take in lots of fluid the day before as well as on the actual day of training or racing. Sports drinks are ideal, especially during a run because they contain simple carbohydrates that provide fuel for the working muscles, and sodium that increases the rate of fluid absorption in the small intestine. Drink small amounts every 10min rather than huge amounts every 1/2 hour. On a warm day a runner should drink 750- 1000ml for each hour of exercise and even more on a hot day. Weighing yourself before and after the session is a good way to calculate fluid loss. One kilogram is about equal to one litre of fluid.

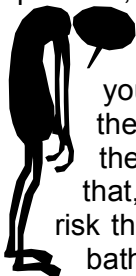
If it's going to be warm, run on a course you know has drinking taps on the way. If running off the beaten track make sure you take one or two water bottles in a proper carry belt (the best ones are sold at bush walking shops). Don't worry about carrying the extra weight, you'll quickly get used to it and believe me you'll be glad you did when you're out doing a two-hour run and the day starts to heat up.

## Slip, slop, slap

Slip on a light, loose fitting singlet; slop on the sunscreen and slap on a hat. Some people hate wearing hats while they run because it feels hot and uncomfortable on their head. The trick is to find a light cap that breathes. It's important to keep the sun off your face as much as possible. Sunglasses are also a good idea. Having to squint during the whole run is annoying to say the least.

## Run early, run late...or give it a break

If the forecast is for a hot day get out early while it's still cool. "I hate mornings " I hear you say. No problem, just organize to meet a friend every Tuesday and Thursday morning at 6:00am. You'll catch up on all the gossip, enjoy a beautiful sunrise and get fit all at the same time. If you can't manage that, run in the evening when the temperature has dropped. Mind you, the mercury doesn't always fall with the sun. A couple of years ago in Melbourne one of the Super Sunset Series races had to be cancelled because, by 7pm on a Wednesday night the temperature was still 42 degrees Celsius. Event Coordinator Simon O'Callaghan said that, after consultation with the medical team they decided to postpone the race rather than risk the safety of competitors. After that I imagine most people swapped their running gear for bathers and headed for the beach for a late night dip!



## Be flexible in where and how you train

Running up in the hills where it is cooler and more shaded, or running along the beach or near a lake, is another adaptation you can make in your training. Join a running group or club that offers such training. Every year I organize training runs for people preparing for the marathon. We get to explore some wonderful countryside and form great friendships on the way. If you're on holidays by the beach and you're a confident swimmer why not cross train and do some run/swim/runs. The swim is a great cool off for the run leg, as well as being physically challenging. Run easier in the heat and use a heart rate monitor. Your heart rate will be elevated higher than usual if you are beginning to over heat.

## Acclimatize

Finally, if you are training for a particular event and there is a chance it will be hot, you must acclimatize yourself to the heat. The human body can adapt well to heat if trained properly. Athletes competing at the Commonwealth Games in Kuala Lumpur trained for several weeks under hot conditions in Australia and in Malaysia prior to the event so that their bodies would be fully acclimatized. Initially exercise intensities must be kept low and duration short. As the body adapts, longer and more rigorous training sessions can be tolerated. Under such conditions it is not unusual for an athlete to consume 2-3 litres of fluid per hour. Physiological adaptations include more efficient sweating/cooling, improved peripheral circulation and greater dilution of sweat, which prevents excessive sodium loss.

Yes, summer is upon us once again. It's a fantastic time for running, playing sport and enjoying the outdoors. Just remember to plan a little, drink a lot, and be flexible in your routine. Whether you're competing seriously or jogging for fun, try always to listen to your body. It never lies.

## References:

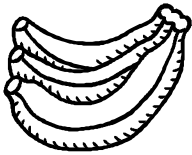
Martin, D. E & Coe, P. N. 1997, *Better Training for Distance Runners*, Human Kinetics, South Australia, pp. 368-372

Burke, L. 1992. *Food for Sports Performance*, Allen & Unwin, NSW, pp. 70-73

# Nutrition for Runners

Distance running is an endurance sport and athletes of any level must pay special attention to their diet if they wish to perform well. There are some general rules to follow but everyone still has individual needs. Getting your eating right takes some trial and error, consulting with a coach or a sports nutritionist can be a great help. Once you've got it right you'll know, because you'll feel a million dollars.

## Glycemic Index- keep your blood sugar levels constant



Carbohydrates are digested in the small intestine and absorbed into the blood stream as glucose, fructose, and galactose. Eventually the liver converts everything to glucose where it is stored as glycogen. When the liver glycogen is full the excess is stored in the muscles. Only after muscle glycogen is full is the glucose converted to fat to be stored around the body. Blood sugar levels are regulated by the release of insulin, which brings the sugar levels down when they climb too high. Foods that are quickly assimilated causing rapid rises in blood sugar are said to have a high glycemic index (high GI). Foods that are broken down slowly, providing a steady release of glucose have a low glycemic index (low GI).

**Low GI foods** are the best sources of fuel during the day, before and during exercise, because they are easily stored as glycogen and provide long term energy. **High GI** foods are beneficial immediately after exercise when the muscles require a rapid replenishment of glycogen.

### Selected Low GI Foods

|  |                                |
|--|--------------------------------|
| Muesli (puffed brown rice, corn, bran) | Wheat spaghetti                |
| All-Bran                               | PerforMax bread                |
| Oatmeal                                | Sweet Potato                   |
| Baked beans                            | Brown rice                     |
| Butter beans                           | Yam                            |
| Kidney beans                           | *Banana (not fully ripe)       |
| Chickpeas                              | *Maxim sports drink (powder)   |
| Lentils                                | *Carb squeezies (leppin etc.)  |
| Soybeans                               | <i>*during training/racing</i> |
| Apples                                 |                                |
| Oranges                                |                                |
| Fructose                               |                                |

### Selected High GI Foods

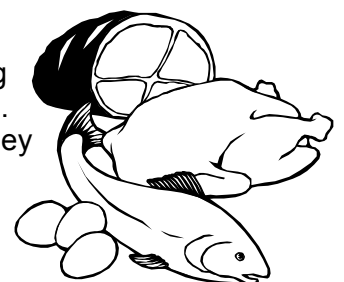
- Cornflakes
- Nutri-Grain
- Shredded wheat
- Raisins
- Ripe bananas
- Wheat bread
- White rice
- Beets
- Carrots
- White potato
- Corn on cob
- Glucose (sports drinks)
- Sucrose
- Jelly snakes, Mars bars etc
- Honey

## Eat small meals regularly

Eat 5-6 small meals each day rather than 2-3 bigger ones. This includes a mid-morning and mid-afternoon snack. Around 7-8 grams of carbohydrates per kilogram of body weight each day is recommended for endurance athletes. This is vital to you maintaining maximum energy levels for training.

## Protein Intake

Protein is very important for the repair of muscle tissue, particularly following speed work, hill training and weight lifting when muscles are often sore. Vegetarians must maintain high levels of protein by eating tofu, lentils, kidney beans, spinach, eggs, wholemeal bread and almonds.



## Fat intake

Not all fats are bad! **Saturated** fats (from meat and dairy) contribute to high cholesterol, clogged arteries, obesity etc and should be kept to a minimum. **Unsaturated** fats however, are vital for maintaining optimum health and should be part of everyone's diet. Also known as essential fatty acids (EFA's) their benefits include better fat metabolism, improved insulin action, lowering of blood pressure and better energy production in the cells. Flax seed oil, virgin olive oil, evening primrose oil, sunflower oil, canola oil are examples of EFA's but lose much of their goodness when heated. It is better to use these on salads etc. Avocado, walnuts, almonds or sunflower seeds make great snacks that are rich in essential fats. Fish such as salmon and mackerel are also very good sources of EFA's

## During training & racing

During exercise lasting longer than an hour, athletes must maintain blood sugar levels for energy. Our muscles can only store enough glycogen to last about 60-75min. Once fuel is depleted your energy level will drop noticeably. We can spare muscle glycogen by taking in around 50g of carbohydrates per hour throughout the duration of long runs, training sessions and of course the marathon. Low to med GI foods or fluids are ideal. Carb squeezies (eg Leppins, Gu) and Maxim powder drink contain long chain carbohydrates, which will give a steady release of fuel without stomach upset. This is important, particularly in racing the Marathon. Typically one squeezie taken with **WATER ONLY** every 25-30min is sufficient. You must have one at the beginning of the run and then every 5km throughout the whole event, long run etc. If you use a drink such as Maxim you must mix it as per the instructions and consume the right amount to get your 50g each hour. Water should be consumed also, especially if conditions are warm or humid. Don't use glucose drinks such as Gatorade etc. They are a high GI fluid and will not give sustainable energy. Blood sugar levels will rise rapidly and then crash. High GI foods and fluids are best **straight after** training and racing.

## Carbohydrate Loading for the Marathon

Increase your carb intake to 9-10g per kg of body weight for 4 days prior to your event not including the day before. If you are racing on Sunday start your loading diet on Tuesday. Increase the amount of Low GI snacks you eat, rather than eating larger meals. Don't try new foods and eat lightly the evening before the event. Increase fluid intake also- 72 hrs prior.

Have a low GI breakfast 2hrs before race start, but go easy on the fibre...for obvious reasons.

Don't have any high GI foods or fluids before the race or you'll feel tired even before you've started running.

## Iron Intake

Iron is a vital nutrient that contributes to the production of our body's hemoglobin and myoglobin. Hemoglobin and myoglobin are responsible for the uptake and transport of oxygen in the blood and muscles. These levels in the body must be maintained if we are to function in our daily work and exercise. Oxygen is a key component in aerobic exercise and if iron stores are depleted your muscles oxygen supply will be compromised. Symptoms are feelings of tiredness, poor recovery from training and greater susceptibility to injury.

**It is recommended that all runners covering long distances (especially women) have a blood test to check Iron levels every 12 months. A sports doctor should be consulted for advice and recommendations on supplements, diet changes etc.**

## Iron Requirements

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|   |                 |
|---|-----------------|
| General training - males & non- menstruating females  | 7mg/ day        |
| General training - menstruating females               | 12 - 16mg/ day  |
| General training - growing adolescents                | 10 - 13mg/ day  |
| Pregnancy (trimester 2 & 3)                           | 22 - 36mg/ day  |
| Endurance training - males & non-menstruating females | 7 - 17.5mg/ day |
| Endurance training - menstruating females             | 16 - 23mg/ day  |

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## Iron sources

| Hemme: (cooked weight) |      |           | Non-Hemme:           |               |       |
|------------------------|------|-----------|----------------------|---------------|-------|
| Liver                  | 100g | 11.0mg    | Eggs                 | 100g (2)      | 2.0mg |
| Liver pate             | 40g  | 2-2mg     | Breakfast cereal     | 30g           | 2.5mg |
| Lean steak             | 100g | 4.0mg     | Wholemeal bread      | 60g (1 slice) | 1.4mg |
| Chicken (dark meat)    | 100g | 1.2mg     | Spinach, broccoli    | 145g          | 4.4mg |
| Fish                   | 100g | 0.6-1.4mg | Lentils/kidney beans | 100g(2 cups)  | 2.5mg |
| Oysters                | 100g | 3.9mg     | Tofu                 | 100g          | 1.9mg |
| Salmon                 | 100g | 1.5mg     | Sultanas             | 50g           | 0.9mg |
|                        |      |           | Dried apricots       | 50g           | 2.0mg |
|                        |      |           | Almonds              | 50g           | 2.1mg |

## Calcium

As most people are aware, calcium is needed for healthy bones. Lack of calcium can lead to osteoporosis in later life, especially among women. Stress fractures among runners can usually be attributed to weak bones brought on by inadequate calcium intake over a long period of time. The recommended amount of calcium for men and women is 800mg/ day and 1000- 1200mg for growing adolescents, pregnant and breast-feeding women.

Sources of calcium include milk, cheese, yoghurt, soymilk, almonds, tahini, sardines, salmon with the bones and tofu. **3-4 good servings each day should be enough to maintain calcium levels.**

## Sample meals for endurance athletes

Recommended carbohydrate intake is 7-8g per kg body weight (carb loading 9-10 g)

| Food for <b>50 kg athlete</b><br>(50x 7grms =350grams per day) | Carbs<br>(gm) | Food for <b>60 kg athlete</b><br>(60x7grms= 420 g)  | Carbs<br>(gm) |
|--|---------------|---|---------------|
| <b>Breakfast</b>   |               | <b>Breakfast</b>                                    |               |
| 2 eggs on toast  | 30            | 1 1/2 cups Sustain cereali, low fat milk,           | 75            |
| 1x banana  | 25            | 1x banana   | 25            |
| 1 large glass 100% fruit juice                                 | 25            | 1 large glass 100% fruit juice                      | 25            |
| <b>Snack</b>   |               | <b>Snack</b>  |               |
| 2 cups fruit salad & yogurt                                    | 50            | 2 cups fruit salad & yogurt                         | 50            |
| <b>Lunch</b>   |               | <b>Lunch</b>  |               |
| 1 cup pasta with tomato/tuna sauce                             | 50            | 1 large wholemeal roll bread with lean beef,        | 40            |
| 300ml fruit juice  | 35            | chicken, tuna, egg etc and salad                    | 35            |
| <b>Pre Training Snack</b>                                      |               | 300ml fruit juice                                   |               |
| 1x fruit scone   | 25            | <b>Pre Training Snack</b>                           | 50            |
| 1 banana   | 25            | Museli bar(s) & sports drink                        | 25            |
| <b>Dinner</b>  |               | 1 banana  |               |
| Lean meat, poultry, fish or legumes                            | 75            | <b>Dinner</b>                                       |               |
| With 1 1/4 cups steamed rice <b>or</b> 2 med sized             |               | Lean meat, poultry, fish or legumes                 | 85            |
| sweet potatoes   | 10            | With 1 1/2 cups steamed rice <b>or</b> 2 cups pasta |               |
| 1 cup steamed vegetables                                       |               | <b>or</b> 2 large sweet potatoes                    | 10            |
|  | <b>350g</b>   | 1 cup steamed vegetables                            |               |
|  |               |   | <b>420gr</b>  |

### References:

Burke, L, (1992). *Food for Sports Performance*, Allen and Unwin, NSW

Martinez, T. (1999), *Glycemic Index, Application to Dietary Management*, (Seminar Notes)



# Injury and Illness



## Common Causes of Injury

- **Increasing training volume too quickly.** Don't increase your weekly mileage by more than 5-10% each week. Your long run should not be increased by more than 1-2km per week. Beginners should have a shorter run on alternate weeks. Especially first time Marathoners!
- **Going too hard, too soon.** Speed work should only be included when a good running base has been established. Long runs of at least 10km, hill runs and slightly stronger paced running should be established over at least 3-4months before progressing to the next stage.
- **Incorrect/worn out shoes.** A running shoe has a life of about 3-4months only (800-1000km). An advanced runner covering 120km per week+ will need new shoes every 2months. Don't wear your runners for general use, they will wear out sooner. Shin splints often occur when runners train in worn out shoes. If you pronate you must wear a more supportive shoe. Shin pain is often related to foot pronation and in many cases orthotics may be the only answer. A Podiatrist can give you advice on this matter.
- **Lack of strength or muscle imbalance.** Weak muscles are prone to injury. General strength in the legs and upper body will help prevent injury and also give you more power needed for hills and speed work. Stability and alignment of the hips is important for correct running technique and injury prevention. Core strength work (abs, lower back, obliques etc) will help considerably.
- **Lack of flexibility.** Tight muscles are weaker and less able to cope with dynamic stretching (fast running). Regular stretching must be included in your program. Massages are also important. Stretching will not get rid of scar tissue in muscles. Calves and hamstrings particularly need regular massaging. **Tightness is an early warning sign that must not be ignored.** Self-massage can be very good when you are unable to see a masseur.

## What to do if you have an injury or illness

- **Muscle and tendon strains or tears** will usually result in swelling, bruising etc. Follow the R.I.C.E. procedure. Rest, Ice (10min on 10min off as regularly as possible for the first 24-48hr period), Compression (bandage for support and to help restrict swelling), Elevate to reduce blood flow to the area and ease swelling. Rest the injured part. You should cross train only if it doesn't aggravate the injury.
- **Colds, Flu etc.** Do not train when you are sick. If you have a temperature your resting pulse will be elevated (8-10beats higher) than normal. Wait until your pulse is back to normal. Viruses are very contagious; don't risk spreading it around the group. Take time off to get better.

## Specific Injury Management

### Achilles

Early signs may be soreness in the calf or pain directly in the Achilles. Ice immediately and seek treatment from a Physio or sports masseur. Avoid speed work, hills and drills. Cross train while it heals. Stretch the calf and Achilles with both straight and bent leg 2-3x30sec daily. Strengthen the Achilles by doing straight leg calf raises 10-15x holding up for 5-10sec each time and lowering slowly. Hold a weight or use a calf machine in the gym as you get stronger but don't hold for as long. Aim for 2-3sets. Do exercises daily without weights or 3x p/week with weights.

### Hamstring Strains

Begin with regular Icing and gentle stretches. Massage will help once soreness settles down. Deep massage can aggravate a torn Hamstring! Avoid hill reps, fast runs. Etc. Relaxed runs are OK. Be patient, hamstrings take time to heal. Strengthen as advised by physio. Cycling is great cross training!

## **Iliotibial Band Syndrome (ITB)**

This will manifest as soreness on the outside of your knee. You may just feel very tight down the outer thigh. If inflamed on the outer knee, rest totally from running, ice to reduce inflammation (anti-inflammatories will help). Seek treatment from a physio or sports masseur immediately. Deep massage along the ITB as well as in the gluteus and lower back area will be necessary. ITB and hip stretching must be done regularly. Hip alignment and stability are the causes here and strengthening of the gluteus medius will help considerably. This muscle can be strengthened by doing side lying straight leg raises- lifting 30 degrees, squeeze the butt muscles, 3x15-20. Use ankle weights, as you get stronger. Do this 3x per week as consistently as possible. Core strength is important also. When returning to running start with quick strides over 60-100m with walk recoveries. Do 5 and build to 10 over a 3 week period. Increase the strides to 150-200m with a jog back recovery and then work in longer runs gradually.

## **Plantar Fasciitis**

Symptoms include pain in the arch of the foot or in the heel. It is usually caused from running too much too soon. The muscle and tendons of the foot are put under a lot of stress when running and care must be taken to build mileage slowly. Ice to reduce inflammation and seek treatment. Massage will help considerably. You can roll your foot on a tennis ball for 10min (daily) to help break up scar tissue in the arch. See a masseur and also consider acupuncture, which has been known to be very beneficial. Stretch the calf and Achilles with a towel around the toes pulling the foot back (straight and bent leg) 3x20-30 sec. Orthotics may be necessary if the problem persists but consult a physiotherapist first.

## **Patella Pain- Runners Knee**

This inflammation is felt just below the kneecap and is due to a constant rubbing of the patella against the top of the shinbone. This happens when the patella isn't tracking properly in the femoral joint. You should ice the knee to reduce inflammation and seek treatment. Weak inner quad muscles (vastus medialis) and tight outer quads cause this tracking problem with the kneecap being pulled slightly to the side during running. To correct this problem the outer quads need to be loosened up with massage and stretching and the vastus medialis needs to be strengthened. A physio can show you how to tape the knee to help align the patella properly. Strengthen the VM by doing single leg shallow knee bends (30 degrees only). Stand on one leg, hold onto something for balance then squat slowly keeping the knee just over the toes then straighten up. Do 2-3 sets of 15-20 reps each day. An alternative is to use a leg press machine to do single leg presses (30 degrees only from straight leg position). Cycling is a good exercise for the VM also. Make sure your seat is reasonably high so your knees don't bend too deeply. Avoid hills and stairs as this uses a lot of outer quad muscle and will aggravate the problem.

## **Shin Splints**

This is not so straightforward and there can be a variety of causes. In most cases the pain is simply tight or strained muscles and or tendons around the shin area in which case massage, ice and a reduction in running will relieve this injury. Over pronation of the foot while running or running on uneven surfaces can be the cause. Correct shoes that have good support or sometimes orthotics will often solve the problem. If you increase your running too quickly or run on concrete too often you are likely to get sore shins. In severe cases a runner may get a stress fracture in the tibia as a result of too much hard running. A bone scan will reveal this immediately and recovery takes several weeks. There are a number of stretches to do for the shin area using a towel. Lie on your back with your leg straight up and a towel around the foot. Pull with your outer hand so that your foot tilts outward (hold for 30 sec). Now pull down with the inside hand to tilt the foot inwards thus stretching the outside of the shins. Repeat 3 times each side. Strengthen the tibia muscles by walking on your heels and toes alternately, toes pointed in, as well as out (5sec each x6-10).

**Reference:** Bauman A. (March 2000), Pain Relief, *Runner's World*, Australian Ed. Melb, pp60-69.

# Strength Development for Runners

Runners should work at strengthening muscles, tendons and ligaments to help prevent injury. If you wish to push yourself to higher levels through speed work, racing, longer runs etc you must pay attention to your strength. As well as preventing injury having greater strength will improve your stride length, give you better hill surging ability and help delay muscle fatigue during longer runs. Below are some specific strength exercises which can be done at home or in a gym. It is important to learn correct technique, to start gradually and seek help from an instructor or coach. During rehabilitation your physio can give advice on modifications to exercises. Particular care should be taken with back pain. NOT ALL THESE EXERCISES WILL SUIT EVERYONE. 2-3x 30min workouts per week is all that is needed to gain good strength. Remember ...start easy!

## Walt Reynold's Special Achilles Strengthenener

Stand facing a wall about 25-30 inches away. Balance on the right leg (foot pointing forward) and the left leg held just in front of the body. Bend the right knee ( half squat) as you do this extend the other leg forward so that the toes touch the wall. Then return to start position. Repeat this again but with the leg extending to the wall but more towards the left (diagonally). Repeat again but this time move the left foot across the body toward the wall. Now repeat all 3 movements on the other leg. Do this 4-6x to start and build to 20. You can hold weights as you get stronger.

## Eccentric / Concentric Calf Raise

Balance on the edge of a step on the balls of the feet (two feet) with heels hanging over the edge. Lift up onto the toes then taking the weight off one foot, lower back down slowly so that the calf is fully stretched. Then using both feet again, raise back up onto the toes then swap the weight to the other foot and lower the heel again. Use weights or a calf machine to increase resistance. Progress gradually.

2-3 sets 10-15 reps. Do exercises daily at first then reduce to 2-3x per week as you start to use heavier weights.

## Hip abduction/adduction

You can choose to use either wall pulleys in a gym or use strong rubber tubing (eg therabands). Stand on your right leg and place the band around the ankle of the left leg. With the body kept in an upright position swing the right leg out to the side against the resistance. Maintain a stable pelvis/trunk position and keep leg straight. Gradually increase resistance load as you become stronger. 2x10-20 each side.

## Single leg squat

Stand on one leg with the knee just slightly bent. The other leg is extended behind with the foot resting on a bench/chair. Squat down on the supporting leg as far as feels comfortable, keeping your knee behind your toes. Straighten again. Keep upper body in an upright position. Keep hips stable. Use a weight as strength increases (dumbbells). 2x 10-20

## Supine- Hamstring exercise

Start by lying on your back with one leg bent. Push hips up squeezing your gluteal & hamstring muscles. Keep the straight leg extended while the bent leg does the work. Slowly lower back down before repeating- 2x10-20

# Weight training

## Build a base

Runners wishing to further improve overall strength should train with weights in a gym 2x per week (30min max). Start with light weights for the first 3-4 weeks then increase gradually to moderate weights for another 6-8weeks. During this time do not push to maximum effort or injury may occur. Work up to 15-20 reps (1-2 sets).

## Building real strength

Once your base has been developed you can then begin pushing up the weights to maximise strength development. This must be done very gradually and with good technique. Start by increasing your weights and reducing the reps to 2 sets of 8-12. After 6-8 weeks you will be ready to go to a heavier strength phase where you are lifting heavier weights but only 1-2 sets of 4-6reps. Always do a warm up set first!

## Will I increase muscle bulk?

This type of training is not body building. Its purpose is to increase general strength. Lifting heavier weights with low reps improves motor unit recruitment therefore increasing strength. Muscle size may increase slightly. But if this contributes to functional strength and helps prevent injury then this is a good thing.

## Sample Strength Routine

BB dead lifts  
Lat pulldown or seated rows  
Bench press  
Squats (progressing to single leg)  
Front/ Side plank (2-3x-30-60sec)

## Can I do circuits with lighter weights?

Yes. A runner can also develop general strength as well as cardiovascular conditioning with circuit training. Of course the strength gains won't be as great but some runners may enjoy this type of workout more. There are proven aerobic benefits in circuit training also because the heart rate is maintained at a high level for the duration of the workout. When creating a circuit keep to compound exercises as much as possible ie. exercises that use multiple joints/muscle groups such as squats, push ups etc. Alternate strength exercises with running, cycling, skipping etc to keep heart rate up.

## Sample 20 station circuit (45-60sec each)- Warm up 15 jog

|                             |                                 |
|-----------------------------|---------------------------------|
| 1. Push ups                 | 11. BB upright row              |
| 2. Step ups                 | 12. Bike                        |
| 3. Skipping                 | 13. Back extensions (ball)      |
| 4. Medicine ball twist      | 14. Squats                      |
| 5. BB bent over rows        | 15. Plank                       |
| 6. Side step or jumps (box) | 16. Mine Trampoline- high knees |
| 7. Dips                     | 17. DB shoulder press           |
| 8. skipping                 | 18. Shuttle run                 |
| 9. Cycling crunches         | 19. Crunches                    |
| 10. Lunges                  | 20. Hops                        |

## Outdoor circuits

Warm up 10-15min running

Alternate each strength exercise with a **shuttle run** (40-60m to a tree or cone). You can do this with a partner. While one person runs the other does a strength exercise, then swaps.

35-40min with 3 circuit repeats (30sec 1<sup>st</sup> set/ 45sec 2<sup>nd</sup> set/ 60sec 3<sup>rd</sup> set). For easier option do just 1 or 2 x through

Squats  
Push ups  
Lunges

Cycle crunches  
Star jumps  
Hopping (x5 alt)

Planks (variations)  
180o turn jumps  
dips

...another example

Warm up 10min run & drills (butt kicks, high knees etc)

3x accelerations 40m/50m/60m jog back recovery  
3x longer accelerations 80-100m- this time with a 200m jog recovery





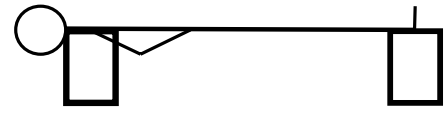

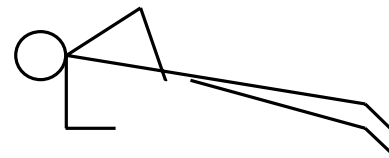
1min max push ups  
1min max squats  
Run 200-300m  
(Repeat)

Extended push ups- from standing position walk out on your hands to push-up position and hold 3-5sec. To make harder move hands further in front of you so that you form a bridge. Walk your hands back in then stand up. Repeat x6-10

Side plank – 30-60sec change sides every 10sec  
Run around triangle  
Repeat x2  
cool down 1.5k jog

# Core Strength

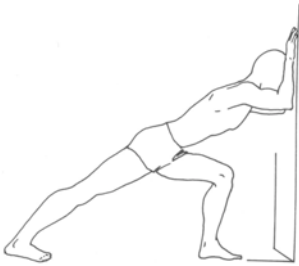
## Abdominal & Lower Back Strength

|   |  |
|---|--|
| <p><b>Prone jack-knife</b><br/>-keep upper body still<br/>2-3x10-15 slowly</p>  |    |
| <p><b>Supine hip extension</b><br/>-general back strength-<br/>push hips upwards<br/>2-3x10 or hold 15-30sec</p>  |    |
| <p><b>Oblique crunches</b><br/>-lying side ways over<br/>ball<br/>2-3x10-15</p>   |    |
| <p><b>Forward rolls</b><br/>-From knees<br/>2-3x10-15 or hold 15-30sec</p>  |   |
| <p><b>Reverse Plank- Back</b><br/>Advanced back<br/>exercise.<br/>Rest shoulders and<br/>heels on a bench- hold<br/>back straight- keep hips<br/>up. 2-3x30-60sec</p>                             |  |
| <p><b>Plank – Abs</b><br/>On elbows- Hold back in<br/>straight position- face to<br/>floor- 3-4x 30-60sec.<br/>(option to lift one leg 3<br/>inches off the ground for<br/>10sec alternating.</p> |  |
| <p><b>Side Plank- Obliques</b><br/>Balance on your side on<br/>one elbow. Hold 15-<br/>30sec each side x3-4<br/>Don't let hip sag towards<br/>ground.</p>   |  |

- Use correct sized ball- when sitting on ball, knees bent 90 degrees, thighs should be parallel to floor or hips only slightly higher. (sizes are 55cm, 65cm, 75cm)
- Warm-up before exercises
- Perform exercises slowly, the key is to keep hips up high & don't let the back sag.

# Stretching for Runners

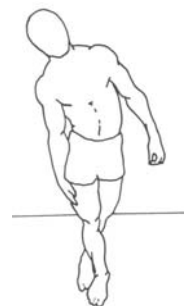
Calf Stretch



Quad Stretch



ITB Stretch



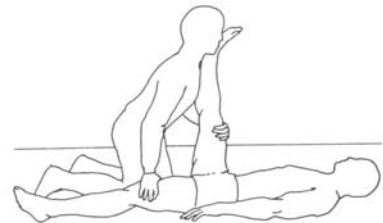
Hip/psoas Stretch



Hamstring Stretch



PNF Hamstring Stretch



Hip/lwr back Stretch



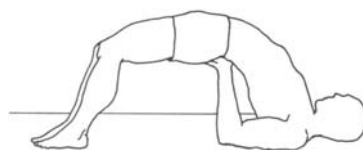
Yoga twist



Groin Stretch



Bridge Pose



Hold stretches for 20-30sec (x2), breathe slowly and relax. Don't force the stretch.

# Cross Training Workouts

Cross training is very useful in maintaining a runner's fitness level when injured. Mixing in a variety of less impacting workouts such as water running and cycling may also prevent staleness and over training.

## Injured- What about my long run?

Obviously the long run is the most important session for a marathon runner. So if you become injured and can't run what can you do? Depending on the type of injury you can replace the long run with a long bike ride or even better a long walk with a back pack for extra strength. Check with your physio to see what is OK. You must go out for at least the same time as you would be running and even a little longer to make up for the lower stress. I would even recommend doing two long cross training sessions per week (2-3hrs) while not running.

## Deep water running

Should be done in deep water using a buoyancy belt. Feet do not touch the bottom and head remains above water. If the pool has a shallow end you can sometimes incorporate running in waist deep water. However if you have a lower leg injury stay in deep water. During exercise heart rates in water stay 10-15 beats lower than on land for the same effort level. eg. 150bpm running on land is equivalent to approx 135bpm in the water. NB. Recoveries between reps are low intensity running.

### Workout 1

Warm up & cooldown 5-10min

Main set: 32min- 2x 3min/3x2min/4x1min Build intensity as intervals get shorter. Go easy for the same amount of time after each hard effort.

### Workout 2

Warm up & cooldown 5-10min

Main set: 35min- 2 sets of 5x2min with 1min recovery and 5min between sets

Option to swim 5min between sets.

### Workout 3

Main set: 30-60min- 3-4x 10-15min Build intensity -75/80/85/90% continuous.

## Water running/ swimming/ kicking

For variety you can alternate freestyle, breaststroke etc and use flippers for kicking

### Workout 1

Main set: 40min

Swim 5min  
Water run 5min  
Swim 5min  
Kick (board) 5min  
Repeat x2

### Workout 2

Main set: 30-45min

Water run 5min  
Kick 5min  
Swim 5min  
Repeat x 2-3

### Workout 3

Main set:30-45min

Water run 10min  
Kick 5min  
Repeat x2-3

### Workout 4

Main set: 40min

Water run 10min- kick -5min  
Water run 8min – kick 4min  
Water run 6min – kick 3min  
Water run 3min – kick 1 1/2min

Build intensity with each set  
Option to swim instead of kick  
Cooldown 5-10min

## Cycle Sessions

These sessions can be done on a stationary bike in a gym, on a road bike set up on a wind trainer or on a velodrome. Heart rates during cycling tend to stay 10 beats lower than for the same effort in running. Eg 150bpm running is equivalent to 140bpm cycling

### Workout 1

Main set: 40-60min

10/8/6/4/2min start at 70% and build to 95% last 2min. Cadence- 90rpm

Repeat x2 or cooldown 10-15min easy spin

### Workout 2

Warm up & cooldown 10min

Main set: 45min max

1-2x 20min at threshold or just below (85%) with 5min easy spin recovery

### Workout 3

Warm up & cooldown 10min

Main set: 40min- 2sets of 4x 5min

each 5min block as follows:

1min hard - 4min easy

2min hard - 3min easy

3min hard - 2min easy

4min hard - 1min easy

Repeat- no rest



### Workout 4

Warm up & cooldown 15min- include 5 medium hard surges of 20-30sec in w/up

Main set: 18-30min

6-10x 1min @95%+ Hard! Cadence 95-110rpm

Recovery spin easy for 2min between efforts

## Cycle/Run Brick sessions

These workouts are good if you can still run (not injured). Great for triathlon preparation. Can be done using stationary bike and treadmill or outside around a park or velodrome

Optimum cadence (pedal speed) is 90-95rpm.

### Workout 1

Warm up & cooldown 10min

Cycle 3-5km plus run 1-2km off bike

Repeat x3- May build each set stronger or maintain same pace. Should be continuous without rest.

### Workout 2

Warm up & cooldown 10min

Cycle 10-15k plus 3-4k run off bike

**Option- Repeat twice.** Build intensity in second set



# Heart Rate Training Zones

| Max Heart rate (bpm) | Rest Heart rate (bpm) | E1 recovery 60-70% |     | E2 Aerobic conditioning 70-80% |     | E3 Anaerobic Threshold 80-90% |     | E4 Aerobic Power (10k race pace) 90-94% |     | E5 Vo2Max (3k-10k pace) 92-97% |     |
|----------------------|-----------------------|--------------------|-----|--------------------------------|-----|-------------------------------|-----|---|-----|--------------------------------|-----|
|                      |                       |                    |     |                                |     |                               |     |   |     |                                |     |
| 200                  | 45                    | 138                | 154 | 154                            | 169 | 169                           | 185 | 185                                     | 191 | 188                            | 195 |
| 200                  | 55                    | 142                | 157 | 157                            | 171 | 171                           | 186 | 186                                     | 191 | 188                            | 196 |
| 200                  | 65                    | 146                | 160 | 160                            | 173 | 173                           | 187 | 187                                     | 192 | 189                            | 196 |
| 200                  | 75                    | 150                | 163 | 163                            | 175 | 175                           | 188 | 188                                     | 193 | 190                            | 196 |
| 195                  | 45                    | 135                | 150 | 150                            | 165 | 165                           | 180 | 180                                     | 186 | 183                            | 191 |
| 195                  | 55                    | 139                | 153 | 153                            | 167 | 167                           | 181 | 181                                     | 187 | 184                            | 191 |
| 195                  | 65                    | 143                | 156 | 156                            | 169 | 169                           | 182 | 182                                     | 187 | 185                            | 191 |
| 195                  | 75                    | 147                | 159 | 159                            | 171 | 171                           | 183 | 183                                     | 188 | 185                            | 191 |
| 190                  | 45                    | 132                | 147 | 147                            | 161 | 161                           | 176 | 176                                     | 181 | 178                            | 186 |
| 190                  | 55                    | 136                | 150 | 150                            | 163 | 163                           | 177 | 177                                     | 182 | 179                            | 186 |
| 190                  | 65                    | 140                | 153 | 153                            | 165 | 165                           | 178 | 178                                     | 183 | 180                            | 186 |
| 190                  | 75                    | 144                | 156 | 156                            | 167 | 167                           | 179 | 179                                     | 183 | 181                            | 187 |
| 185                  | 45                    | 129                | 143 | 143                            | 157 | 157                           | 171 | 171                                     | 177 | 174                            | 181 |
| 185                  | 55                    | 133                | 146 | 146                            | 159 | 159                           | 172 | 172                                     | 177 | 175                            | 181 |
| 185                  | 65                    | 137                | 149 | 149                            | 161 | 161                           | 173 | 173                                     | 178 | 175                            | 181 |
| 185                  | 75                    | 141                | 152 | 152                            | 163 | 163                           | 174 | 174                                     | 178 | 176                            | 182 |
| 180                  | 45                    | 126                | 140 | 140                            | 153 | 153                           | 167 | 167                                     | 172 | 169                            | 176 |
| 180                  | 55                    | 130                | 143 | 143                            | 155 | 155                           | 168 | 168                                     | 173 | 170                            | 176 |
| 180                  | 65                    | 134                | 146 | 146                            | 157 | 157                           | 169 | 169                                     | 173 | 171                            | 177 |
| 180                  | 75                    | 138                | 149 | 149                            | 159 | 159                           | 170 | 170                                     | 174 | 172                            | 177 |
| 175                  | 45                    | 123                | 136 | 136                            | 149 | 149                           | 162 | 162                                     | 167 | 165                            | 171 |
| 175                  | 55                    | 127                | 139 | 139                            | 151 | 151                           | 163 | 163                                     | 168 | 165                            | 171 |
| 175                  | 65                    | 131                | 142 | 142                            | 153 | 153                           | 164 | 164                                     | 168 | 166                            | 172 |
| 175                  | 75                    | 135                | 145 | 145                            | 155 | 155                           | 165 | 165                                     | 169 | 167                            | 172 |
| 170                  | 45                    | 120                | 133 | 133                            | 145 | 145                           | 158 | 158                                     | 163 | 160                            | 166 |
| 170                  | 55                    | 124                | 136 | 136                            | 147 | 147                           | 159 | 159                                     | 163 | 161                            | 167 |
| 170                  | 65                    | 128                | 139 | 139                            | 149 | 149                           | 160 | 160                                     | 164 | 162                            | 167 |
| 170                  | 75                    | 132                | 142 | 142                            | 151 | 151                           | 161 | 161                                     | 164 | 162                            | 167 |

First estimate (or test) your maximum heart rate. Then measure your resting heart rate- look up the corresponding values on the chart. Follow the line across the chart to establish your training zones. If they seem too high or low simply adjust your chosen Max heart rate value down or up.

Heart Rate Training Zones are calculated using formula-

**(Max HR- resting HR) X training % then add back resting HR**

- Max HR= 220-age (males)
- Max HR= 226-age (females)

**Individuals may vary- recording maximal heart rate in a time trial eg 1500m will give accurate result.**

Eg 30yr old male has a MHR of 190bpm & a resting HR of 55bpm) we calculate a Training Zone of eg. 75% as follows: 190-55 =138x .75= 103.5+55= 158 BPM

# 10k - 21k- Marathon Time Projection Chart

| 10k Time | Pace min p/km | Half Marathon Time | Pace min p/km | Marathon Time | Pace min p/km | 10k Time | Pace min p/km | Half Marathon Time | Pace min p/km | Marathon Time | Pace min p/km |
|----------|---------------|--------------------|---------------|---------------|---------------|----------|---------------|--------------------|---------------|---------------|---------------|
| 30:00    | 3:00          | 1:06:54            | 3:10          | 2:26:24       | 3:28          | 45:00    | 4:30          | 1:40:21            | 4:45          | 3:38:15       | 5:10          |
| 30:20    | 3:02          | 1:07:39            | 3:12          | 2:28:02       | 3:30          | 45:20    | 4:32          | 1:41:06            | 4:47          | 3:39:52       | 5:13          |
| 30:40    | 3:04          | 1:08:23            | 3:14          | 2:29:39       | 3:33          | 45:40    | 4:34          | 1:41:50            | 4:50          | 3:41:29       | 5:15          |
| 31:00    | 3:06          | 1:09:08            | 3:17          | 2:31:17       | 3:35          | 46:00    | 4:36          | 1:42:35            | 4:52          | 3:43:06       | 5:17          |
| 31:20    | 3:08          | 1:09:52            | 3:19          | 2:32:54       | 3:37          | 46:20    | 4:38          | 1:43:19            | 4:54          | 3:44:43       | 5:20          |
| 31:40    | 3:10          | 1:10:37            | 3:21          | 2:34:32       | 3:40          | 46:40    | 4:40          | 1:44:04            | 4:56          | 3:46:20       | 5:22          |
| 32:00    | 3:12          | 1:11:22            | 3:23          | 2:36:10       | 3:42          | 47:00    | 4:42          | 1:44:49            | 4:58          | 3:47:57       | 5:24          |
| 32:20    | 3:14          | 1:12:06            | 3:25          | 2:37:47       | 3:44          | 47:20    | 4:44          | 1:45:33            | 5:00          | 3:49:34       | 5:26          |
| 32:40    | 3:16          | 1:12:51            | 3:27          | 2:39:25       | 3:47          | 47:40    | 4:46          | 1:46:18            | 5:02          | 3:51:11       | 5:29          |
| 33:00    | 3:18          | 1:13:35            | 3:29          | 2:41:02       | 3:49          | 48:00    | 4:48          | 1:47:02            | 5:04          | 3:52:48       | 5:31          |
| 33:20    | 3:20          | 1:14:20            | 3:31          | 2:42:40       | 3:51          | 48:20    | 4:50          | 1:47:47            | 5:06          | 3:54:25       | 5:33          |
| 33:40    | 3:22          | 1:15:05            | 3:33          | 2:44:18       | 3:54          | 48:40    | 4:52          | 1:48:32            | 5:09          | 3:56:02       | 5:36          |
| 34:00    | 3:24          | 1:15:49            | 3:36          | 2:45:55       | 3:56          | 49:00    | 4:54          | 1:49:16            | 5:11          | 3:57:39       | 5:38          |
| 34:20    | 3:26          | 1:16:34            | 3:38          | 2:47:33       | 3:58          | 49:20    | 4:56          | 1:50:01            | 5:13          | 3:59:16       | 5:40          |
| 34:40    | 3:28          | 1:17:18            | 3:40          | 2:49:10       | 4:01          | 49:40    | 4:58          | 1:50:45            | 5:15          | 4:00:53       | 5:42          |
| 35:00    | 3:30          | 1:18:03            | 3:42          | 2:50:48       | 4:03          | 50:00    | 5:00          | 1:51:30            | 5:17          | 4:02:30       | 5:45          |
| 35:20    | 3:32          | 1:18:48            | 3:44          | 2:52:26       | 4:05          | 50:20    | 5:02          | 1:52:15            | 5:19          | 4:04:07       | 5:47          |
| 35:40    | 3:34          | 1:19:32            | 3:46          | 2:54:03       | 4:07          | 50:40    | 5:04          | 1:52:59            | 5:21          | 4:05:44       | 5:49          |
| 36:00    | 3:36          | 1:20:17            | 3:48          | 2:55:41       | 4:10          | 51:00    | 5:06          | 1:53:44            | 5:23          | 4:07:21       | 5:52          |
| 36:20    | 3:38          | 1:21:01            | 3:50          | 2:57:18       | 4:12          | 51:20    | 5:08          | 1:54:28            | 5:26          | 4:08:58       | 5:54          |
| 36:40    | 3:40          | 1:21:46            | 3:53          | 2:58:56       | 4:14          | 51:40    | 5:10          | 1:55:13            | 5:28          | 4:10:35       | 5:56          |
| 37:00    | 3:42          | 1:22:31            | 3:55          | 3:00:34       | 4:17          | 52:00    | 5:12          | 1:55:58            | 5:30          | 4:12:12       | 5:59          |
| 37:20    | 3:44          | 1:23:15            | 3:57          | 3:02:11       | 4:19          | 52:20    | 5:14          | 1:56:42            | 5:32          | 4:13:49       | 6:01          |
| 37:40    | 3:46          | 1:24:00            | 3:59          | 3:03:49       | 4:21          | 52:40    | 5:16          | 1:57:27            | 5:34          | 4:15:26       | 6:03          |
| 38:00    | 3:48          | 1:24:44            | 4:01          | 3:05:26       | 4:24          | 53:00    | 5:18          | 1:58:11            | 5:36          | 4:17:03       | 6:05          |
| 38:20    | 3:50          | 1:25:29            | 4:03          | 3:07:04       | 4:26          | 53:20    | 5:20          | 1:58:56            | 5:38          | 4:18:40       | 6:08          |
| 38:40    | 3:52          | 1:26:14            | 4:05          | 3:08:42       | 4:28          | 53:40    | 5:22          | 1:59:41            | 5:40          | 4:20:17       | 6:10          |
| 39:00    | 3:54          | 1:26:58            | 4:07          | 3:10:19       | 4:31          | 54:00    | 5:24          | 2:00:25            | 5:42          | 4:21:54       | 6:12          |
| 39:20    | 3:56          | 1:27:43            | 4:09          | 3:11:57       | 4:33          | 54:20    | 5:26          | 2:01:10            | 5:45          | 4:23:31       | 6:15          |
| 39:40    | 3:58          | 1:28:27            | 4:12          | 3:13:34       | 4:35          | 54:40    | 5:28          | 2:01:54            | 5:47          | 4:25:08       | 6:17          |
| 40:00    | 4:00          | 1:29:12            | 4:14          | 3:15:12       | 4:38          | 55:00    | 5:30          | 2:02:39            | 5:49          | 4:26:45       | 6:19          |
| 40:20    | 4:02          | 1:29:57            | 4:16          | 3:16:50       | 4:40          | 55:20    | 5:32          | 2:03:24            | 5:51          | 4:28:22       | 6:22          |
| 40:40    | 4:04          | 1:30:41            | 4:18          | 3:18:27       | 4:42          | 55:40    | 5:34          | 2:04:08            | 5:53          | 4:29:59       | 6:24          |
| 41:00    | 4:06          | 1:31:26            | 4:20          | 3:20:05       | 4:44          | 56:00    | 5:36          | 2:04:53            | 5:55          | 4:31:36       | 6:26          |
| 41:20    | 4:08          | 1:32:10            | 4:22          | 3:21:42       | 4:47          | 56:20    | 5:38          | 2:05:37            | 5:57          | 4:33:13       | 6:28          |
| 41:40    | 4:10          | 1:32:55            | 4:24          | 3:23:20       | 4:49          | 56:40    | 5:40          | 2:06:22            | 5:59          | 4:34:50       | 6:31          |
| 42:00    | 4:12          | 1:33:40            | 4:26          | 3:24:58       | 4:51          | 57:00    | 5:42          | 2:07:07            | 6:01          | 4:36:27       | 6:33          |
| 42:20    | 4:14          | 1:34:24            | 4:28          | 3:26:35       | 4:54          | 57:20    | 5:44          | 2:07:51            | 6:04          | 4:38:04       | 6:35          |
| 42:40    | 4:16          | 1:35:09            | 4:31          | 3:28:13       | 4:56          | 57:40    | 5:46          | 2:08:36            | 6:06          | 4:39:41       | 6:38          |
| 43:00    | 4:18          | 1:35:53            | 4:33          | 3:29:50       | 4:58          | 58:00    | 5:48          | 2:09:20            | 6:08          | 4:41:18       | 6:40          |
| 43:20    | 4:20          | 1:36:38            | 4:35          | 3:31:28       | 5:01          | 58:20    | 5:50          | 2:10:05            | 6:10          | 4:42:55       | 6:42          |
| 43:40    | 4:22          | 1:37:23            | 4:37          | 3:33:06       | 5:03          | 58:40    | 5:52          | 2:10:50            | 6:12          | 4:44:32       | 6:45          |
| 44:00    | 4:24          | 1:38:07            | 4:39          | 3:34:43       | 5:05          | 59:00    | 5:54          | 2:11:34            | 6:14          | 4:46:09       | 6:47          |
| 44:20    | 4:26          | 1:38:52            | 4:41          | 3:36:21       | 5:08          | 59:20    | 5:56          | 2:12:19            | 6:16          | 4:47:46       | 6:49          |
| 44:40    | 4:28          | 1:39:36            | 4:43          | 3:37:58       | 5:10          | 59:40    | 5:58          | 2:13:03            | 6:18          | 4:49:23       | 6:51          |

**Estimating your Marathon or Half Marathon time-** Estimate your race finish time using your current best time for 10k. Look up your time on the chart, then look across the table to see what your projected times for the half and full marathon distances will be.

# Marathon Race Pacing- 5km Even Split Times

| 5km   | 10km    | 15km    | 20km    | 21.1km         | 25km    | 30km    | 35km    | 40km    | Marathon Goal Time |
|-------|---------|---------|---------|----------------|---------|---------|---------|---------|--------------------|
| 16:35 | 33:11   | 49:46   | 1:06:21 | <b>1:10:00</b> | 1:22:56 | 1:39:32 | 1:56:07 | 2:12:42 | <b>2:20:00</b>     |
| 16:57 | 33:53   | 50:50   | 1:07:46 | <b>1:11:30</b> | 1:24:43 | 1:41:40 | 1:58:36 | 2:15:33 | <b>2:23:00</b>     |
| 17:18 | 34:36   | 51:54   | 1:09:12 | <b>1:13:00</b> | 1:26:30 | 1:43:47 | 2:01:05 | 2:18:23 | <b>2:26:00</b>     |
| 17:39 | 35:18   | 52:58   | 1:10:37 | <b>1:14:30</b> | 1:28:16 | 1:45:55 | 2:03:35 | 2:21:14 | <b>2:29:00</b>     |
| 18:01 | 36:01   | 54:02   | 1:12:02 | <b>1:16:00</b> | 1:30:03 | 1:48:03 | 2:06:04 | 2:24:05 | <b>2:32:00</b>     |
| 18:22 | 36:44   | 55:06   | 1:13:28 | <b>1:17:30</b> | 1:31:49 | 1:50:11 | 2:08:33 | 2:26:55 | <b>2:35:00</b>     |
| 18:43 | 37:26   | 56:10   | 1:14:53 | <b>1:19:00</b> | 1:33:36 | 1:52:19 | 2:11:03 | 2:29:46 | <b>2:38:00</b>     |
| 19:05 | 38:09   | 57:14   | 1:16:18 | <b>1:20:30</b> | 1:35:23 | 1:54:27 | 2:13:32 | 2:32:36 | <b>2:41:00</b>     |
| 19:26 | 38:52   | 58:18   | 1:17:44 | <b>1:22:00</b> | 1:37:09 | 1:56:35 | 2:16:01 | 2:35:27 | <b>2:44:00</b>     |
| 19:47 | 39:34   | 59:22   | 1:19:09 | <b>1:23:30</b> | 1:38:56 | 1:58:43 | 2:18:30 | 2:38:18 | <b>2:47:00</b>     |
| 20:09 | 40:17   | 1:00:26 | 1:20:34 | <b>1:25:00</b> | 1:40:43 | 2:00:51 | 2:21:00 | 2:41:08 | <b>2:50:00</b>     |
| 20:30 | 41:00   | 1:01:30 | 1:21:59 | <b>1:26:30</b> | 1:42:29 | 2:02:59 | 2:23:29 | 2:43:59 | <b>2:53:00</b>     |
| 20:51 | 41:42   | 1:02:34 | 1:23:25 | <b>1:28:00</b> | 1:44:16 | 2:05:07 | 2:25:58 | 2:46:49 | <b>2:56:00</b>     |
| 21:13 | 42:25   | 1:03:38 | 1:24:50 | <b>1:29:30</b> | 1:46:03 | 2:07:15 | 2:28:28 | 2:49:40 | <b>2:59:00</b>     |
| 21:34 | 43:08   | 1:04:42 | 1:26:15 | <b>1:31:00</b> | 1:47:49 | 2:09:23 | 2:30:57 | 2:52:31 | <b>3:02:00</b>     |
| 21:55 | 43:50   | 1:05:45 | 1:27:41 | <b>1:32:30</b> | 1:49:36 | 2:11:31 | 2:33:26 | 2:55:21 | <b>3:05:00</b>     |
| 22:16 | 44:33   | 1:06:49 | 1:29:06 | <b>1:34:00</b> | 1:51:22 | 2:13:39 | 2:35:55 | 2:58:12 | <b>3:08:00</b>     |
| 22:38 | 45:16   | 1:07:53 | 1:30:31 | <b>1:35:30</b> | 1:53:09 | 2:15:47 | 2:38:25 | 3:01:03 | <b>3:11:00</b>     |
| 22:59 | 45:58   | 1:08:57 | 1:31:57 | <b>1:37:00</b> | 1:54:56 | 2:17:55 | 2:40:54 | 3:03:53 | <b>3:14:00</b>     |
| 23:20 | 46:41   | 1:10:01 | 1:33:22 | <b>1:38:30</b> | 1:56:42 | 2:20:03 | 2:43:23 | 3:06:44 | <b>3:17:00</b>     |
| 23:42 | 47:24   | 1:11:05 | 1:34:47 | <b>1:40:00</b> | 1:58:29 | 2:22:11 | 2:45:53 | 3:09:34 | <b>3:20:00</b>     |
| 24:03 | 48:06   | 1:12:09 | 1:36:13 | <b>1:41:30</b> | 2:00:16 | 2:24:19 | 2:48:22 | 3:12:25 | <b>3:23:00</b>     |
| 24:24 | 48:49   | 1:13:13 | 1:37:38 | <b>1:43:00</b> | 2:02:02 | 2:26:27 | 2:50:51 | 3:15:16 | <b>3:26:00</b>     |
| 24:46 | 49:32   | 1:14:17 | 1:39:03 | <b>1:44:30</b> | 2:03:49 | 2:28:35 | 2:53:20 | 3:18:06 | <b>3:29:00</b>     |
| 25:07 | 50:14   | 1:15:21 | 1:40:28 | <b>1:46:00</b> | 2:05:36 | 2:30:43 | 2:55:50 | 3:20:57 | <b>3:32:00</b>     |
| 25:28 | 50:57   | 1:16:25 | 1:41:54 | <b>1:47:30</b> | 2:07:22 | 2:32:51 | 2:58:19 | 3:23:47 | <b>3:35:00</b>     |
| 25:50 | 51:40   | 1:17:29 | 1:43:19 | <b>1:49:00</b> | 2:09:09 | 2:34:59 | 3:00:48 | 3:26:38 | <b>3:38:00</b>     |
| 26:11 | 52:22   | 1:18:33 | 1:44:44 | <b>1:50:30</b> | 2:10:55 | 2:37:07 | 3:03:18 | 3:29:29 | <b>3:41:00</b>     |
| 26:32 | 53:05   | 1:19:37 | 1:46:10 | <b>1:52:00</b> | 2:12:42 | 2:39:15 | 3:05:47 | 3:32:19 | <b>3:44:00</b>     |
| 26:54 | 53:47   | 1:20:41 | 1:47:35 | <b>1:53:30</b> | 2:14:29 | 2:41:22 | 3:08:16 | 3:35:10 | <b>3:47:00</b>     |
| 27:15 | 54:30   | 1:21:45 | 1:49:00 | <b>1:55:00</b> | 2:16:15 | 2:43:30 | 3:10:45 | 3:38:01 | <b>3:50:00</b>     |
| 27:36 | 55:13   | 1:22:49 | 1:50:26 | <b>1:56:30</b> | 2:18:02 | 2:45:38 | 3:13:15 | 3:40:51 | <b>3:53:00</b>     |
| 27:58 | 55:55   | 1:23:53 | 1:51:51 | <b>1:58:00</b> | 2:19:49 | 2:47:46 | 3:15:44 | 3:43:42 | <b>3:56:00</b>     |
| 28:19 | 56:38   | 1:24:57 | 1:53:16 | <b>1:59:30</b> | 2:21:35 | 2:49:54 | 3:18:13 | 3:46:32 | <b>3:59:00</b>     |
| 28:40 | 57:21   | 1:26:01 | 1:54:42 | <b>2:01:00</b> | 2:23:22 | 2:52:02 | 3:20:43 | 3:49:23 | <b>4:02:00</b>     |
| 29:02 | 58:03   | 1:27:05 | 1:56:07 | <b>2:02:30</b> | 2:25:09 | 2:54:10 | 3:23:12 | 3:52:14 | <b>4:05:00</b>     |
| 29:23 | 58:46   | 1:28:09 | 1:57:32 | <b>2:04:00</b> | 2:26:55 | 2:56:18 | 3:25:41 | 3:55:04 | <b>4:08:00</b>     |
| 29:44 | 59:29   | 1:29:13 | 1:58:57 | <b>2:05:30</b> | 2:28:42 | 2:58:26 | 3:28:11 | 3:57:55 | <b>4:11:00</b>     |
| 30:06 | 1:00:11 | 1:30:17 | 2:00:23 | <b>2:07:00</b> | 2:30:28 | 3:00:34 | 3:30:40 | 4:00:45 | <b>4:14:00</b>     |
| 30:27 | 1:00:54 | 1:31:21 | 2:01:48 | <b>2:08:30</b> | 2:32:15 | 3:02:42 | 3:33:09 | 4:03:36 | <b>4:17:00</b>     |
| 30:48 | 1:01:37 | 1:32:25 | 2:03:13 | <b>2:10:00</b> | 2:34:02 | 3:04:50 | 3:35:38 | 4:06:27 | <b>4:20:00</b>     |

Pacing your self in the Marathon- **Plan to run at an even pace for the marathon. Choose your goal finish time then record your 5km split times. You should aim to run past the 5km points on the course as close to your specified times as possible. You should have a good idea of your goal finish time based on your 10k best effort (2-3 weeks before the marathon) and 1/2 marathon time trial (6-8 weeks before the marathon). Speak to your coach and consult the Projected Race Times Table (1500m-42km) to accurately predict your finish time.**

## 5k-10km Race Pace Chart

| 1km  | 2km   | 3km   | 4km   | 5km          | 6km   | 7km   | 8km   | 9km   | 10km         | 400m lap |
|------|-------|-------|-------|--------------|-------|-------|-------|-------|--------------|----------|
| 3:00 | 06:00 | 09:00 | 12:00 | <b>15:00</b> | 18:00 | 21:00 | 24:00 | 27:00 | <b>30:00</b> | 1:12     |
| 3:02 | 06:04 | 09:06 | 12:08 | <b>15:10</b> | 18:12 | 21:14 | 24:16 | 27:18 | <b>30:20</b> | 1:13     |
| 3:04 | 06:08 | 09:12 | 12:16 | <b>15:20</b> | 18:24 | 21:28 | 24:32 | 27:36 | <b>30:40</b> | 1:14     |
| 3:06 | 06:12 | 09:18 | 12:24 | <b>15:30</b> | 18:36 | 21:42 | 24:48 | 27:54 | <b>31:00</b> | 1:14     |
| 3:08 | 06:16 | 09:24 | 12:32 | <b>15:40</b> | 18:48 | 21:56 | 25:04 | 28:12 | <b>31:20</b> | 1:15     |
| 3:10 | 06:20 | 09:30 | 12:40 | <b>15:50</b> | 19:00 | 22:10 | 25:20 | 28:30 | <b>31:40</b> | 1:16     |
| 3:12 | 06:24 | 09:36 | 12:48 | <b>16:00</b> | 19:12 | 22:24 | 25:36 | 28:48 | <b>32:00</b> | 1:17     |
| 3:14 | 06:28 | 09:42 | 12:56 | <b>16:10</b> | 19:24 | 22:38 | 25:52 | 29:06 | <b>32:20</b> | 1:18     |
| 3:16 | 06:32 | 09:48 | 13:04 | <b>16:20</b> | 19:36 | 22:52 | 26:08 | 29:24 | <b>32:40</b> | 1:18     |
| 3:18 | 06:36 | 09:54 | 13:12 | <b>16:30</b> | 19:48 | 23:06 | 26:24 | 29:42 | <b>33:00</b> | 1:19     |
| 3:20 | 06:40 | 10:00 | 13:20 | <b>16:40</b> | 20:00 | 23:20 | 26:40 | 30:00 | <b>33:20</b> | 1:20     |
| 3:22 | 06:44 | 10:06 | 13:28 | <b>16:50</b> | 20:12 | 23:34 | 26:56 | 30:18 | <b>33:40</b> | 1:21     |
| 3:24 | 06:48 | 10:12 | 13:36 | <b>17:00</b> | 20:24 | 23:48 | 27:12 | 30:36 | <b>34:00</b> | 1:22     |
| 3:26 | 06:52 | 10:18 | 13:44 | <b>17:10</b> | 20:36 | 24:02 | 27:28 | 30:54 | <b>34:20</b> | 1:22     |
| 3:28 | 06:56 | 10:24 | 13:52 | <b>17:20</b> | 20:48 | 24:16 | 27:44 | 31:12 | <b>34:40</b> | 1:23     |
| 3:30 | 07:00 | 10:30 | 14:00 | <b>17:30</b> | 21:00 | 24:30 | 28:00 | 31:30 | <b>35:00</b> | 1:24     |
| 3:33 | 07:06 | 10:39 | 14:12 | <b>17:45</b> | 21:18 | 24:51 | 28:24 | 31:57 | <b>35:30</b> | 1:25     |
| 3:36 | 07:12 | 10:48 | 14:24 | <b>18:00</b> | 21:36 | 25:12 | 28:48 | 32:24 | <b>36:00</b> | 1:26     |
| 3:39 | 07:18 | 10:57 | 14:36 | <b>18:15</b> | 21:54 | 25:33 | 29:12 | 32:51 | <b>36:30</b> | 1:28     |
| 3:42 | 07:24 | 11:06 | 14:48 | <b>18:30</b> | 22:12 | 25:54 | 29:36 | 33:18 | <b>37:00</b> | 1:29     |
| 3:45 | 07:30 | 11:15 | 15:00 | <b>18:45</b> | 22:30 | 26:15 | 30:00 | 33:45 | <b>37:30</b> | 1:30     |
| 3:48 | 07:36 | 11:24 | 15:12 | <b>19:00</b> | 22:48 | 26:36 | 30:24 | 34:12 | <b>38:00</b> | 1:31     |
| 3:51 | 07:42 | 11:33 | 15:24 | <b>19:15</b> | 23:06 | 26:57 | 30:48 | 34:39 | <b>38:30</b> | 1:32     |
| 3:54 | 07:48 | 11:42 | 15:36 | <b>19:30</b> | 23:24 | 27:18 | 31:12 | 35:06 | <b>39:00</b> | 1:34     |
| 3:57 | 07:54 | 11:51 | 15:48 | <b>19:45</b> | 23:42 | 27:39 | 31:36 | 35:33 | <b>39:30</b> | 1:35     |
| 4:00 | 08:00 | 12:00 | 16:00 | <b>20:00</b> | 24:00 | 28:00 | 32:00 | 36:00 | <b>40:00</b> | 1:36     |
| 4:03 | 08:06 | 12:09 | 16:12 | <b>20:15</b> | 24:18 | 28:21 | 32:24 | 36:27 | <b>40:30</b> | 1:37     |
| 4:06 | 08:12 | 12:18 | 16:24 | <b>20:30</b> | 24:36 | 28:42 | 32:48 | 36:54 | <b>41:00</b> | 1:38     |
| 4:09 | 08:18 | 12:27 | 16:36 | <b>20:45</b> | 24:54 | 29:03 | 33:12 | 37:21 | <b>41:30</b> | 1:40     |
| 4:12 | 08:24 | 12:36 | 16:48 | <b>21:00</b> | 25:12 | 29:24 | 33:36 | 37:48 | <b>42:00</b> | 1:41     |
| 4:15 | 08:30 | 12:45 | 17:00 | <b>21:15</b> | 25:30 | 29:45 | 34:00 | 38:15 | <b>42:30</b> | 1:42     |
| 4:18 | 08:36 | 12:54 | 17:12 | <b>21:30</b> | 25:48 | 30:06 | 34:24 | 38:42 | <b>43:00</b> | 1:43     |
| 4:21 | 08:42 | 13:03 | 17:24 | <b>21:45</b> | 26:06 | 30:27 | 34:48 | 39:09 | <b>43:30</b> | 1:44     |
| 4:24 | 08:48 | 13:12 | 17:36 | <b>22:00</b> | 26:24 | 30:48 | 35:12 | 39:36 | <b>44:00</b> | 1:46     |
| 4:27 | 08:54 | 13:21 | 17:48 | <b>22:15</b> | 26:42 | 31:09 | 35:36 | 40:03 | <b>44:30</b> | 1:47     |
| 4:30 | 09:00 | 13:30 | 18:00 | <b>22:30</b> | 27:00 | 31:30 | 36:00 | 40:30 | <b>45:00</b> | 1:48     |
| 4:36 | 09:12 | 13:48 | 18:24 | <b>23:00</b> | 27:36 | 32:12 | 36:48 | 41:24 | <b>46:00</b> | 1:50     |
| 4:42 | 09:24 | 14:06 | 18:48 | <b>23:30</b> | 28:12 | 32:54 | 37:36 | 42:18 | <b>47:00</b> | 1:53     |
| 4:48 | 09:36 | 14:24 | 19:12 | <b>24:00</b> | 28:48 | 33:36 | 38:24 | 43:12 | <b>48:00</b> | 1:55     |
| 4:54 | 09:48 | 14:42 | 19:36 | <b>24:30</b> | 29:24 | 34:18 | 39:12 | 44:06 | <b>49:00</b> | 1:58     |
| 5:00 | 10:00 | 15:00 | 20:00 | <b>25:00</b> | 30:00 | 35:00 | 40:00 | 45:00 | <b>50:00</b> | 2:00     |
| 5:06 | 10:12 | 15:18 | 20:24 | <b>25:30</b> | 30:36 | 35:42 | 40:48 | 45:54 | <b>51:00</b> | 2:02     |
| 5:12 | 10:24 | 15:36 | 20:48 | <b>26:00</b> | 31:12 | 36:24 | 41:36 | 46:48 | <b>52:00</b> | 2:05     |
| 5:18 | 10:36 | 15:54 | 21:12 | <b>26:30</b> | 31:48 | 37:06 | 42:24 | 47:42 | <b>53:00</b> | 2:07     |
| 5:24 | 10:48 | 16:12 | 21:36 | <b>27:00</b> | 32:24 | 37:48 | 43:12 | 48:36 | <b>54:00</b> | 2:10     |
| 5:30 | 11:00 | 16:30 | 22:00 | <b>27:30</b> | 33:00 | 38:30 | 44:00 | 49:30 | <b>55:00</b> | 2:12     |
| 5:36 | 11:12 | 16:48 | 22:24 | <b>28:00</b> | 33:36 | 39:12 | 44:48 | 50:24 | <b>56:00</b> | 2:14     |
| 5:42 | 11:24 | 17:06 | 22:48 | <b>28:30</b> | 34:12 | 39:54 | 45:36 | 51:18 | <b>57:00</b> | 2:17     |
| 5:48 | 11:36 | 17:24 | 23:12 | <b>29:00</b> | 34:48 | 40:36 | 46:24 | 52:12 | <b>58:00</b> | 2:19     |
| 5:54 | 11:48 | 17:42 | 23:36 | <b>29:30</b> | 35:24 | 41:18 | 47:12 | 53:06 | <b>59:00</b> | 2:22     |