



2026

Introduction

Running the marathon represents one of the ultimate tests of endurance, speed and willpower. The marathon captures the imagination of athletes and inspires individuals across the globe. Marathons have experienced a significant increase in participation with amateur, recreational and professional athletes taking part in organised events across the world.



Recent years have marked key milestones in the history of the event, with new world records being set for both men and women. The London Marathon (2026) marked the first time that two runners completed a competitive event in less than 2 hours. The rise in marathon popularity has been paralleled by a growing scientific interest in the physiological, training and nutritional requirements for marathon running. These scientific approaches to date have empowered marathon runners, from amateur to professional, to achieve their individual goals.

The Gatorade Sports Science Institute (GSSI) has a long history of sports science research, education and testing athletes to help optimize their health and performance. Since 1985 GSSI has experience working with some of the best practitioners, teams, and endurance athletes across the world. The provision of this service would not be possible without the translation of sports science

research into practice. Most recently, the GSSI toolkit series has translated the latest science into practical recommendations for athletes and practitioners.

It is common for marathon runners to be dedicated to the training plan. However, in our experience few runners pay the same attention to their nutrition. Therefore, the aim of this Marathon Toolkit is to help provide science-backed guidance on how runners can integrate sports nutrition and hydration recommendations into their marathon preparation. The toolkit is not designed to cover all topics of marathon preparation. Nor should the guide be considered as a consensus for practice in marathon running. Instead, the toolkit aims to provide a guide for all runners, independent of their level, to help achieve their individual marathon goals. From finishing, to running personal best times, sports nutrition and hydration strategies are key considerations in the preparation for, and completion of, running a marathon.



Dr Ian Rollo
Head of GSSI International
Performance and Education
Engagements



Dr Vlad Sabou
GSSI Senior Scientist



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The Global Marathon



London Marathon 2025



Participants by Gender:



45%



55%



840,318

a “**world record**” number of runners applied to run the **2025 London marathon**



World's Oldest Marathon!



The **Boston Marathon** was founded in **1897** following the success of the first modern Olympic marathon in 1896

CHICAGO

One of the **flattest** and **fastest** marathons in the world hosting **multiple world records**



RIO DE JANEIRO



One of the most **picturesque** coastal races in the world



World-renowned as the **fastest marathon**, with **11 world records** set on it



Asia's Oldest!

The **Seoul Marathon** is **one of Asia's oldest** marathons with **35000-40000** runners completing it annually

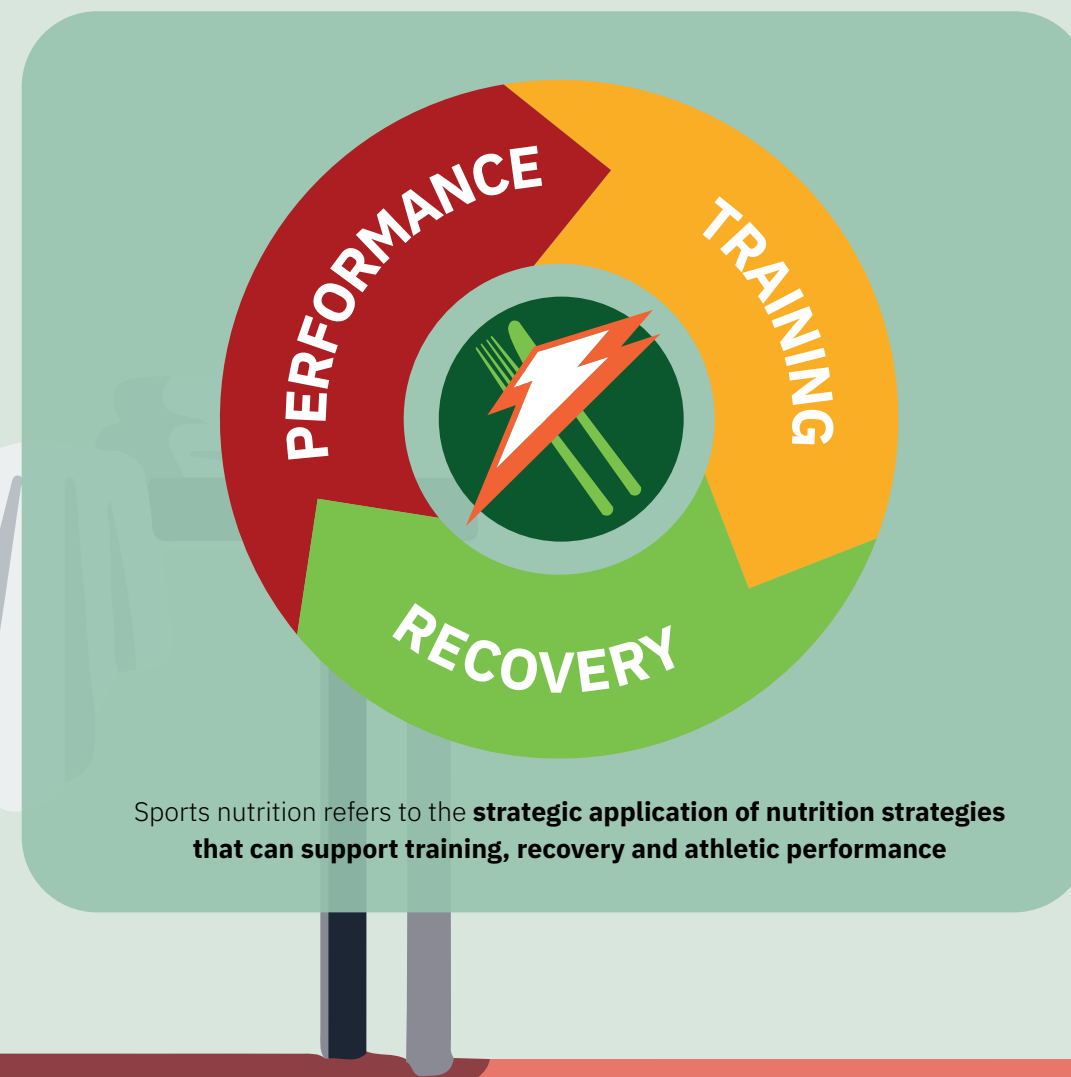


Benefits of Sports Nutrition

Alongside training, nutrition represents a key component of marathon preparation. Consuming the right foods and fluids in appropriate amounts is an important component as they provide the energy required to train, as well as to help support recovery and may help support training adaptations that occur in response to training. It is important that marathon runners follow first a balanced, healthy diet that includes all the main food groups and that meets their energy requirements. This represents the foundation of health and wellbeing, on top of which sports nutrition can be added.

Sports nutrition refers to the **strategic application of nutrition strategies that can help support training, recovery and athletic performance.** It focuses on ensuring that the timing, type and total quantity of food and fluids consumed is adapted to the physiological demands of training and competition. This includes adjusting daily energy and carbohydrate intake to support training and competition workload, as well as consuming sufficient protein to promote muscle repair and adaptation. Importantly for running, sports nutrition also considers nutrient timing, including the pre-exercise and during exercise ingestion of carbohydrate (also referred to as 'fuelling') which help sustain physical and mental performance.

“Sports nutrition integrates evidence-based dietary strategies which are tailored to the athlete’s sport, training programme, body composition goals, individual characteristics and performance goals, to systematically support both acute performance outcomes and may help facilitate long-term training adaptations and athletic development.”





Training for a Marathon

“To run 42.195km (26.2 miles) is one of the ultimate challenges in sport

Getting to the marathon finish line in the desired time takes a level of commitment that begins long before race day. It starts with setting up and following a science-backed training plan. Ultimately, the goal of training is to prepare the body to run the entire marathon distance. However, the training plan will vary widely depending on the current physical condition, experience and individual goals of the runner.

Depending on the starting point, a marathon training plan can include as few as 3-4 and as many as 8-10 running sessions per week, covering varying distances. Research studies show that runners with a marathon time of ~3 h (~200 mins) usually run around **50 km per week**, while elite runners with marathon times of ~130 mins and ~150 mins for males and females cover **~205 km** and **165 km weekly**, respectively. Importantly, these training distances are not covered at the same pace/intensity. Instead, a mix of short and long endurance runs, combined with speed and interval-based sessions, are recommended.

Typical running sessions completed as part of marathon training include **Easy Runs, Steady Runs, Tempo Runs, Interval Runs, Fartlek and Long Runs**. Each type of running session described in Table 1 is completed at a different intensity/pace. In addition, it can also be beneficial for marathon runners to complete 1-2 strength & conditioning sessions per week, as this can help improve several running performance indicators and may help reduce the risk of injury. The aim of all training sessions described so far is to promote improvements in the runner's physiology. It is important to note that training does not just impact a single physiological system but has multiple interconnected benefits (Figure 1).

Exercise intensity can be defined as a percentage of your **maximum heart rate (MHR)**, your **rate of perceived exertion (RPE) (ranging from 0-10)**, and simple breathing cues that help marathoners gauge effort without needing technology. To estimate your MHR, use the formula: **220 minus your age**.



Table 1. Varying training intensities and types to promote endurance, speed, and recovery

EASY RUNNING INTENSITY EASY AND LONG RUNS	 50-60% OF MAXIMUM HEART RATE	5-6/10 RATE OF PERCEIVED EXERTION (RPE) ABLE TO HOLD CONVERSATION
MODERATE RUNNING INTENSITY STEADY RUNS	 60-70% OF MAXIMUM HEART RATE	6-7/10 RATE OF PERCEIVED EXERTION (RPE) HOLD CONVERSATIONS BUT ONLY IN SHORT SENTENCES
HARD RUNNING INTENSITY TEMPO / INTERVAL RUN	 70-80% OF MAXIMUM HEART RATE	7-8/10 RATE OF PERCEIVED EXERTION (RPE) ABLE TO SPEAK A FEW WORDS, BUT NO SENTENCES
VERY HARD RUNNING INTENSITY INTERVAL, FARTLEK AND HILL RUNS	 80-100% OF MAXIMUM HEART RATE	8-10/10 RATE OF PERCEIVED EXERTION (RPE) STRUGGLE TO SPEAK

Mental Benefits



Cognitive Function



Improved Sleep



Stress Relief



Increased Creativity

Physical Benefits



Cardiovascular Health



Muscle Strength



Increased Endurance



Physique Management



Figure 1. Physical and mental beneficial effects of running

Strength Training

Strength training is an important but often overlooked component of marathon preparation. While marathon performance is heavily dependent on aerobic fitness, the ability to tolerate high running mileage over many weeks also relies on the strength and resilience of muscles, tendons, ligaments, and bones. Incorporating regular strength training helps improve the tolerance of tissues, allowing runners to better absorb and generate force with each stride and maintain efficient running mechanics as fatigue develops. This is particularly important during the later stages of a marathon, where declines in strength can negatively affect running economy and increase injury risk. Additionally, strength training plays a key role in injury prevention by increasing tissue load tolerance, helping reduce the risk of overuse injuries.

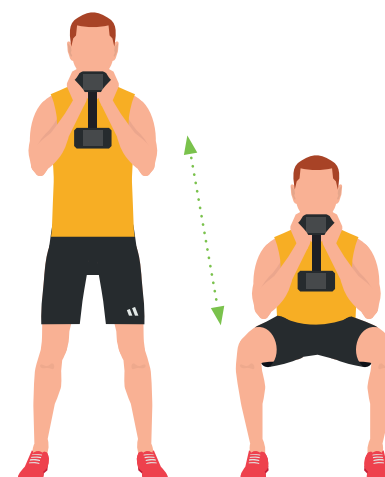
Strength training may be completed 1–2 times per week. Sessions should be time-efficient and focus on key lower-body and trunk muscles involved in running. Loads should be challenging but allow good technique to be maintained throughout each set. During periods of higher running volume (particularly in the final marathon build), runners should prioritise maintaining strength rather than progressing loads and reduce volume slightly during the taper while keeping movement quality high. A complete guide to strength training is beyond the scope of this guide. Nonetheless, some examples of common strength-based exercise are provided in Figure 2.

1 Goblet Squat

This exercise targets the glutes, quadriceps and core muscles.

Hold a weight at your chest and sit down into a squat keeping your chest tall and stand back up

Rep Range = 8 – 10
Set Range = 2 – 3

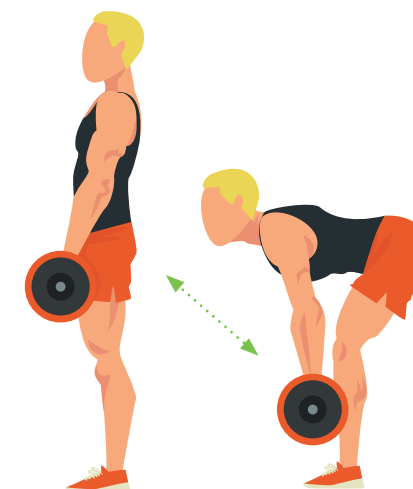


2 Romanian Deadlift

This exercise targets the hamstrings, glutes and lower back muscles

Hold a weight and hinge at the hips with a slight knee bend, lowering the weight down your legs while keeping your back flat and then return to stand tall

Rep Range = 8 – 10
Set Range = 2 – 3

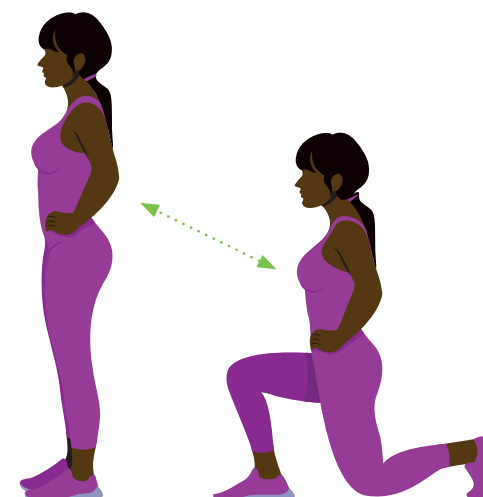


3 Reverse Lunge

This exercise strengthens the glutes, quadriceps and hamstrings while improving single leg stability specific to running

Step one foot back into a lunge and lower under control. Then push up through the front leg to stand tall again

Rep Range = 6 – 8 on each leg
Set Range = 2 – 3

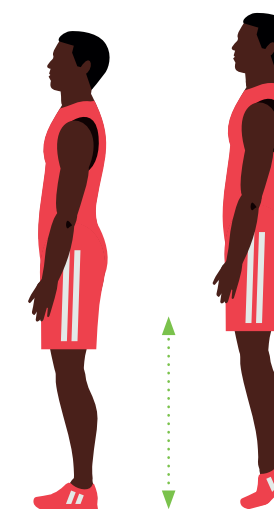


4 Standing Calf Raises

This exercise strengthens the calf muscles and Achilles tendons

Stand tall and rise up onto your toes, then lower back down under control

Rep Range = 10 - 15
Set Range = 2 – 3

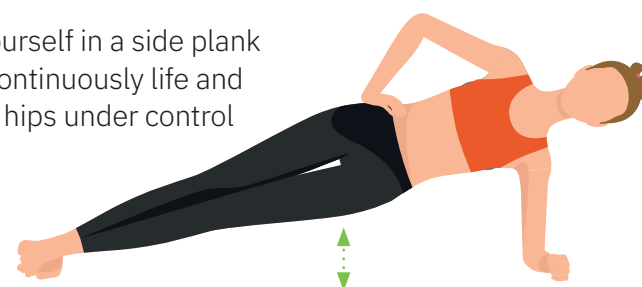


5 Side Plank Raises

This exercise strengthens the obliques abdominals and hip stabilizer muscles

Position yourself in a side plank and then continuously lift and lower your hips under control

Rep Range = 10 – 15 on each side
Set Range = 2 – 3



6 Bird Dog

This exercise targets core stability through strengthening the core and glute stabilisers

From a hands and knee position extend the opposite arm and leg while keeping your body stable, then return and switch sides.

Rep Range = 10 – 15 on each side
Set Range = 2 – 3

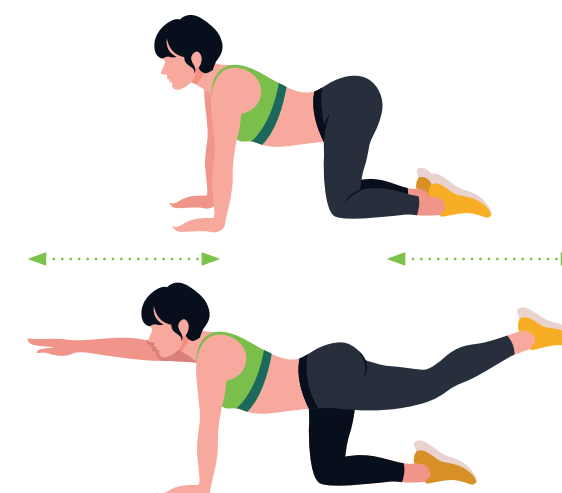


Figure 2. Examples of Strength Training Exercises for Runners

Section Summary

Including different types of training sessions as part of a periodised training programme can help support improvements in enhancement of an aerobic base, running economy and maximal aerobic capacity, as well as an elevation in lactate threshold and critical speed, all characteristics shown in research to be key determinants of marathon performance.

It is however key that within this training framework, progressive overload is applied by systematically manipulating training variables such as intensity, duration and frequency, ensuring gradual increments in weekly mileage and pace to stimulate physiological adaptations while minimising the risk of injury. A commonly used guideline is to limit increases to <10%. An example overview of the weekly training structure is presented in Table 2.

MONDAY
EASY OR STEADY RUN
TUESDAY
REST
WEDNESDAY
INTERVAL RUN
THURSDAY
REST OR STRENGTH TRAINING
FRIDAY
TEMPO RUN
SATURDAY
REST OR EASY RUN
SUNDAY
LONG RUN

Table 2. Example weekly training structure

Fuelling Different Run Days

Periodising carbohydrate and overall energy intake based on the demands of different training days plays a key role in supporting marathon training performance, recovery and adaptation.

High-intensity and longer runs rely heavily on glycogen for energy production. Therefore, increasing carbohydrate intake on these days can support running output and facilitate better recovery. In contrast, recovery or easy runs rely less on carbohydrate for energy and can be fuelled by a lower carbohydrate intake. The adoption of adjusting carbohydrate intake on rest days may facilitate long-term physique management, while still supporting recovery and adaptations following the runs. The carbohydrate requirements of different running days are presented in Table 3.

The remaining of this chapter provides marathon runners with guidelines and practical examples on how to fuel days with Easy Runs; Steady and Tempo Runs; Interval, Fartlek and Hill Runs; Long Runs.

Training Intensity & Duration	Session Type	Carbohydrate Intake
Less than 60 mins of low-intensity	Easy Run or Rest Day	3-5 g.kg of body weight
~60 mins of moderate intensity	Steady and Tempo Runs	5-7 g.kg of body weight
1-3 hour of moderate to high intensity	Interval and Long Runs	6-10 g.kg of body weight
> 4-5 hours per day of moderate to high intensity	Long Runs	8-12 g.kg of body weight

Table 3. Carbohydrate requirements for different training days (American College of Sports Medicine, 2016 Guidelines). Runners are encouraged to choose nutrient-rich carbohydrate sources to allow overall nutrient needs to be met.

Hydration

Consuming sufficient fluids throughout the day, as well as around and during all training runs plays a key role in supporting performance. The Hydration chapter provides more information on how marathon runners can monitor their hydration daily and ensure they are optimally hydrated for training.



Easy Runs

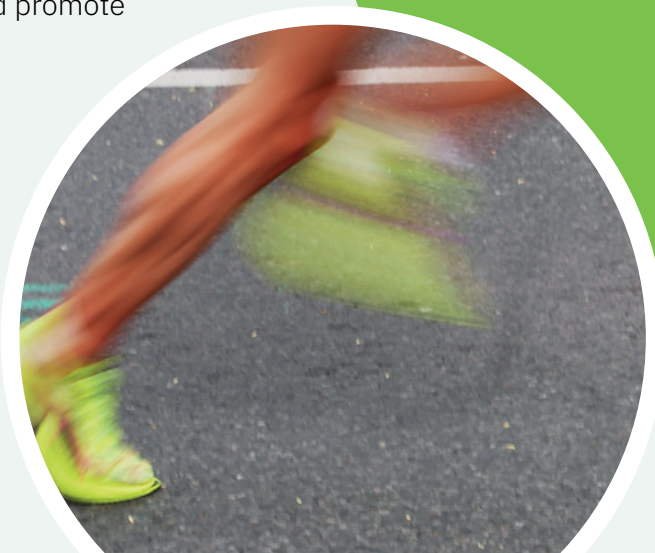
Easy runs help build aerobic base and for recovery. Easy runs should be just that, “easy”, completed at **less than 60%** maximum effort / MHR. During Easy Runs, breathing should be comfortable and the runner should be capable of holding a conversation. Easy runs are important both for the new runner as they begin marathon training as well as experienced runners for recovery days.

Sports Nutrition

Easy Run Days require a daily carbohydrate intake of **3-5 g.kg** body weight. For a 70kg runner this would result in a daily carbohydrate intake of **210-350 g**. The emphasis on this day should be placed on consuming plenty of fruits, vegetables and whole grains as your main carbohydrate sources. Focusing on these food groups will help runners achieve the carbohydrate target for this day, without overconsuming, while at the same time promote an increased fibre and micronutrient intake. Marathon runners should also focus on this day on meeting their protein target (**1.2-2.0 g.kg body weight**) to facilitate muscle repair and promote training adaptations. This would result in a daily protein intake of **85-140g** for a 70kg runner. An example of how an entire day of eating can be planned for **Easy Run Days** is presented at the end of this section.

Marathon runners should also focus on nutrition before, during and after the Easy Run. Given the reduced duration and intensity of this run, it can be completed fasted or the pre-run meal should contain **1-1.5 g.kg** body weight of carbohydrate (**80-100g** for a 70kg runner), consumed **2.5-3 h** before the run. This meal should include more slowly digesting carbohydrates to provide energy for the entire duration of the session. Marathon runners may also consume **~20g** of protein as part of this meal.

Given the reduced intensity and duration of the run, there is no requirement for additional carbohydrate to be consumed during the session. Post-run, it is important that marathon runners consume some carbohydrate and protein (**20-30g**) to restore energy stores and promote muscle repair and adaptation.



Meal plan

Breakfast	Lunch (pre-training meal)	During Run Hydration	Post-Run Recovery Drink	Dinner
Egg Potato & Vegetable Frittata with ½ Avocado	Turkey & Wholegrain Pasta Bolognese	500ml Gatorade Sugar-Free + Additional Water as required during the session	Home-made Smoothie (Milk, Greek Yoghurt, Banana & Berries)	Chicken Thigh Burrito Bowl
				
609kcal, 50g carbohydrate, 33g fat and 26g protein	689kcal, 89g carbohydrate, 17g fat, 45g protein	7kcal, 1g carbohydrate, 0g fat and 0g protein	410 kcal, 50g carbohydrate, 10g fat and 30g protein	774kcal, 90g carbohydrate, 30g fat and 36g protein
2489kcal 280g carbs (4g/kg) 90g fat (33% Total Energy Intake) 137g protein (1.95g/kg)				

Table 4. An example meal plan for Rest Days and Easy Run Days. This plan is based on the needs of a 70kg individual. Runners should adapt these meal plans to meet their energy needs

Product examples are provided for illustrative purposes only; other products with similar nutritional composition may also be suitable.

Fasted runs physique management

Easy Runs can also be performed on a fasted state usually first thing in the morning following an overnight fast, being used as a physique management strategy by endurance athletes. Completing these runs in a fasted state involves lower liver glycogen stores and insulin levels, leading to a higher contribution of fat oxidation to total energy expenditure during the run. Even though fat loss is primarily driven by total daily energy balance, these runs can help promote the higher use of fat to produce energy substrate, an important adaptation for marathon runners.

Steady Runs and Tempo Runs

Steady Runs are completed at **60-70%** maximum effort / MHR and represent the foundation of marathon training, helping marathon runners build the aerobic base needed for completing the remaining marathon training. At this speed, marathoners should be able to hold conversations but only in short sentences.

Tempo Runs are key for building running economy and increasing lactate threshold and should be completed at **70-80%** maximum effort / MHR. Tempo Runs can be run as long intervals or as a steady run of 2-16 km, and due to the increased pace/intensity, should feel challenging.

Sports Nutrition

The Steady and Tempo Runs involve a more moderate effort in training and can also be slightly longer compared to the Easy Runs. Therefore, these days require a carbohydrate intake of **5-7 g.kg** of body weight. For a 70kg runner this would result in a daily carbohydrate intake of **350-490 g**. Although the emphasis on this day should still be placed on consuming plenty of fruits, vegetables and whole grains as your main carbohydrate sources, runners should also include some faster digesting carbohydrate around the running session. Adding these carbohydrates may result in faster availability of energy that can be used to fuel these more demanding runs. Marathon runners should also focus on this day on meeting their protein target (**1.2-2.0 g.kg** body weight) to facilitate muscle repair and promote training adaptations.

Marathon runners should also focus on their nutrition before, during and after the Steady and Tempo Runs. Given the moderate duration and intensity of these sessions, the pre-run meal should contain **1.5-2.0 g.kg** body weight of carbohydrate (**100-140g** for a 70kg runner) and should be consumed 2.5-3 h before the run. This meal should include more slowly digesting carbohydrates to provide energy for the entire duration of the session. This meal can also include **~20g** of protein.

When these runs last over 60 minutes, marathon runners can choose to consume a small amount of carbohydrate (**10-30g**) during the run. This can be represented by a Gatorade Sports Drink (~30g carbohydrate), a small serving of dried fruit (20-25g carbohydrate) or a carbohydrate gel (20-30g). Post-run, it is important that carbohydrate and protein (**20-30g**) is consumed to restore energy stores and promote muscle repair.



Meal plan

Breakfast	Mid-Morning Snack	Lunch (pre-training meal)	During Run Fuelling & Hydration	Post-Run Recovery Drink	Dinner
Apple and Cinnamon Porridge with Peanut Butter	1 Cereal Bar + 1 Orange	Seafood & Chicken Paella	300-400ml Gatorade Thirst Quencher Or 20-30g Dried Apple Slices + Additional Water as required during the session	Home-made Smoothie (Milk, Greek Yoghurt, Banana, Oats & Berries)	Baked Sweet Potato, Salmon & Veggies
					
716kcal, 75g carbohydrate, 25g fat and 23g protein	232kcal, 45g carbohydrate, 4g fat, 4g protein	721kcal, 90g carbohydrate, 19g fat, 45g protein	80kcal, 20g carbohydrate, 0g fat and 0g protein	490 kcal, 70g carbohydrate, 10g fat and 30g protein	679kcal, 82g carbohydrate, 23g fat and 36g protein
2,918 kcal 382g carbs (5.5g/kg) 81g fat (25% Total Energy Intake) 138g protein (1.97g/kg)					

Table 5. An example meal plan for Steady Run Days and Tempo Run Days for a 70kg individual. Runners should adapt these meal plans to meet their energy needs

Product examples are provided for illustrative purposes only; other products with similar nutritional composition may also be suitable.

Interval Runs, Fartlek Runs and HILL Runs

All these types of runs (Intervals, Fartlek or Hill) involve periods of higher-intensity running interspersed with recovery (lower-intensity running) or rest.

There are any number of variations one could use when doing an **Interval Run**, these sessions being key for helping you build speed.

Fartlek is loosely translated from Swedish to “speed play”. Fartlek works on speed and strength by alternating distances and paces during a continuous run. An example Fartlek workout structure could be one-minute running easy followed by one-minute running hard, repeated for a certain number of minutes.

Hill Runs involve periods of running uphill alternated with periods of low intensity running and are great for improving both speed and lower body strength.

To the right you can see several examples of several Interval, Fartlek and Hill Runs. Prior to and at the end of each protocol example, marathoners should also complete a warmup and cool down, respectively.

Sports Nutrition

The Intervals, Hills and Fartlek Runs involve a high-intensity effort for up to 60-70 minutes. Therefore, these days require a carbohydrate intake of **6-8 g.kg** of body weight. For a 70kg runner this would result in a daily carbohydrate intake of **420-560 g**. On these days marathoners should focus on consuming a mix of slow and fast digesting carbohydrate to help reach the daily carbohydrate target. Adding fast

digesting carbohydrates predominantly around and during the run may result in faster availability of energy that can be used to fuel these more demanding sessions. Marathon runners should also focus on this day on meeting their protein target (**1.2-2.0 g.kg** body weight) to facilitate muscle repair and promote training adaptations.

Marathon runners should also focus on their nutrition before, during and after the Intervals, Hills and Fartlek Runs to ensure that they have sufficient energy to perform during these training sessions. Given the moderate duration, but high intensity of these sessions, the pre-run meal should contain **2.0-2.5 g.kg** body weight of carbohydrate (**140-160g** for a 70kg runner) and should be consumed 3 h before the run. This meal should include more faster digesting carbohydrates to be fully digested in time for the session. This meal can also include **~20g** of protein.

To support running output, runners can consume another **30g** of carbohydrate in the last 60 mins before the session for an extra boost of energy. Furthermore, given the high intensity, but moderate duration of the run (60-80 mins), runners can consume **~30g** of carbohydrate during this run. This can be represented by a Gatorade Sports Drink (30g carbohydrate), a serving of ~50-60g of dried fruit (~30g carbohydrate) or a carbohydrate gel (20-30g carbohydrate). Post-run, it is important that marathoners focus on consuming carbohydrate and protein (**20-30g**) early after the run to restore energy store and promote muscle repair.

Interval Run

3 x 5-minutes moderate-hard followed by 5-minutes easy

10 x 1-minute hard followed by 1 minute easy

Fartlek Run

15 x 30 seconds fast followed 1 minute very easy

2 minutes hard followed by 2 minutes easy; 4 minutes moderate-hard followed by 4 minutes easy; 6 minutes moderate followed by 6 minutes easy

Hill Run

60-90 seconds uphill hard effort followed by easy run back for recovery – repeat 6-8 times

20 seconds up-hill sprint followed by 40-60 seconds back for recovery – repeat 10-12 times

Meal plan

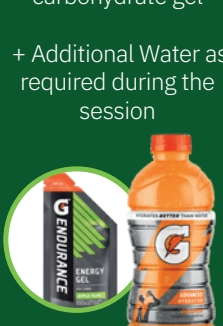
Breakfast	Mid-Morning Snack	Lunch (pre-training meal)	During Run Fuelling & Hydration	Post-Run Recovery Drink	Dinner
Apple and Cinnamon Porridge + Large Glass of Orange Juice	1 Fruit Yoghurt + 1 Banana	Butternut Squash Risotto	500ml Gatorade Thirst Quencher Or one carbohydrate gel + Additional Water as required during the session	Home-made Smoothie (Milk, Greek Yoghurt, Banana, Oats & Dark Chocolate)	Chicken stir-fry served with udon noodles
					
710kcal, 75g carbohydrate, 27g fat and 17g protein	263kcal, 50g carbohydrate, 3g fat, 9g protein	775kcal, 124g carbohydrate, 21g fat, 24g protein	120kcal, 30g carbohydrate, 0g fat and 0g protein	620 kcal, 80g carbohydrate, 20g fat and 30g protein	749kcal, 95g carbohydrate, 17g fat and 55g protein
3237kcal 454g carbs (6.5g/kg) 88g fat (24% Total Energy Intake) 135g protein (1.92g/kg)					

Table 6. An example meal plan for Intervals, Hills and Fartlek Run Days for a 70kg individual. Runners should adapt these meal plans to meet their energy needs

Product examples are provided for illustrative purposes only; other products with similar nutritional composition may also be suitable.

Long Runs

These represent a key part of marathon training, and can be used to build endurance, as well as to practice target marathon pace. In the training plan provided in this guide, Long Runs are shown in both time and distance. Importantly, Long Runs can also be used to practice the pre-race carbohydrate loading protocol, as well as pre-race and in-race fuelling and hydration.

Sports Nutrition

Ensuring that fuelling and hydration is done right for the Long Runs plays a key role in marathon preparation. This is key so that marathon runners have sufficient energy to perform at their best during these sessions. Furthermore, the Long Runs also represent the perfect opportunity for runners to practice their Race fuelling and hydration strategy, helping them establish strategies that work best for them.

Carbohydrate-loading on the day before the Long Run

As these runs are usually be completed in over 1.5-2h, marathon runners should start fuelling these runs the **day before** by implementing a **carbohydrate loading protocol**. On the day before the Long Run, marathoners should aim early in their training programme to consume **6-8 g.kg** of body weight of carbohydrate. As marathoners progress with their training and become more accustomed to consuming a higher carbohydrate intake, their carbohydrate loading protocol can include up to **8-10 g.kg** body weight of carbohydrate. Finally, in the last couple of weeks of preparation, on the day before completing the 20 and 22 Mile Runs, runners should aim to consume **10-12 g.kg** of body weight of carbohydrate. Consuming this carbohydrate intake will help provide energy to support training, as well as allowing them to ‘train’ their gut so that it is comfortable with the ingestion of large doses of carbohydrate. This represents a key adaptation for Race Day. Importantly, marathoners should focus on consuming fast digesting carbohydrate and limit the amount of fibre and fat consumed on these days.

Carbohydrate-loading Meal Plan

Breakfast Apple and Cinnamon Porridge + 600ml Gatorade Thirst Quencher	Mid-Morning Snack 1 Fruit Yoghurt + 1 Banana	Lunch (pre-training meal) Butternut Squash Risotto + One large glass of orange juice	Mid-afternoon snack Large Bowl of Rice Pudding with extra honey	Home-made smoothie Home-made Smoothie (banana, pineapple, orange juice, honey and ice cubes)	Dinner Chicken stir-fry served with udon noodles + Gatorade Thirst Quencher
					
770kcal, 90g carbohydrate, 27g fat and 17g protein	263kcal, 50g carbohydrate, 3g fat, 9g protein	855kcal, 144g carbohydrate, 21g fat, 24g protein	428kcal, 66g carbohydrate, 12g fat and 14g protein	335 kcal, 84g carbohydrate, 1g fat and 4g protein	889kcal, 130g carbohydrate, 17g fat and 55g protein
3540kcal 564g carbs (8 g.kg) 88 g fat (22% Total Energy Intake) 135 g protein (2 g.kg)					

Table 7. An example of a carbohydrate loading meal plan providing 8-9 g carbohydrate per kg body weight per day for a 70kg individual

Product examples are provided for illustrative purposes only; other products with similar nutritional composition may also be suitable.



Fuelling on the day of the Long Run

On the day of the Long Run, marathon runners should aim to consume a high-carbohydrate diet, with a daily intake of **6-10 g.kg** of body mass. This will help ensure having sufficient energy during the run and promote energy restoration after the session. On this day, runners should prioritise fast digesting carbohydrate and limit the amount of fibre and fat consumed on this day. Marathon runners should also focus on this day on meeting their protein target (**1.2-2.0 g.kg** body weight) to facilitate muscle repair and promote training adaptations.

It is also key that marathon runners focus on their nutrition before, during and after the Long Runs to ensure that they have sufficient energy to perform during the run, as well as recover optimally from these sessions. Given the long duration of these sessions, the pre-run meal should contain **2.0-3.0 g.kg** body weight of carbohydrate (**140-210g** for a 70kg runner) and should be consumed 3-4 h before the run. This meal should include fast digesting carbohydrates and avoid fibre and fat sources to be fully digested in time for the session. This represents the perfect opportunity for runners to practice in training their pre-race meal and adjust as needed based on personal preference. Given the long duration of this run, runners can consume another **30g** of carbohydrate in the last 60 mins before the session for an extra boost of energy.

Furthermore, given the long duration of the run, runners should consume **30-90g** of carbohydrate per hour during this run. It is key that marathon runners start consuming the lower end of the recommendations (**30-40g** per hour) and slowly build carbohydrate tolerance by adding **5g** of carbohydrate per hour every week during the Long Run, for as long as comfortable until they reach their carbohydrate intake target. Marathoners should preferably get close to consuming at least **55-60g** of carbohydrate per hour by the time they reach the Marathon Race. This carbohydrate intake can be reached by consuming a combination of sports drinks such Gatorade Sports Drink (30g carbohydrate), carbohydrate gels (20-40g carbohydrate), dried fruit (30g), cereal bars (20-30g) and other carbohydrate rich foods. The fuelling strategy should be combined with the individual hydration plan (Hydration chapter). Post-run, it is important that marathoners focus on consuming carbohydrate and protein (**20-30g**) early after the run to restore energy store and promote muscle repair.



Meal plan

Breakfast	Mid-Morning Snack	During Run Fuelling & Hydration	Post-Run Recovery Drink	Lunch (post-training meal)	Dinner
Berry & Honey Overnight Oats with 1 Large Glass of Orange Juice	1 Bagel with banana and honey	1st hour of the run: 500ml Gatorade Thirst Quencher + One carbohydrate chew 2nd hour of the run: 500ml Gatorade Thirst Quencher + One carbohydrate gel	Home-made Smoothie (Milk, Greek Yoghurt, Banana, Oats & Dark Chocolate)	Butternut Squash Risotto + One large glass of orange juice	Chicken stir-fry served with Udon noodles + 250g grapes
					
750kcal, 85g carbohydrate, 27g fat and 17g protein	395kcal, 81g carbohydrate, 2g fat, 11g protein	480kcal, 120g carbohydrate, 0g fat and 0g protein	620 kcal, 80g carbohydrate, 20g fat and 30g protein	859kcal, 145g carbohydrate, 21g fat, 24g protein	822kcal, 140g carbohydrate, 17g fat and 57g protein
3926kcal 651g carbs (9.3g/kg) 87g fat (20% Total Energy Intake) 139g protein (1.98g/kg)					

Table 8. An example meal plan for a Long Run Day for a 70kg individual. Runners should adapt these meal plans to meet their energy needs

Product examples are provided for illustrative purposes only; other products with similar nutritional composition may also be suitable.

Hydration

The human body is approximately 60% water, being critical for many processes such as regulating your blood volume and blood pressure. Without water the human body would not be able to transport oxygen and nutrients to the brain and working muscles.

Another important role of water is to regulate body temperature. Muscles generate heat during running which causes body temperature to rise. In response, the body produces sweat to dissipate body heat. The evaporation of sweat from the surface of the skin is the primary mechanism which cools the body. Thus, sweating is important to help manage or help reduce the risk of sharp rises in core body temperature, which could lead to reduced running performance and premature fatigue.

Sweat losses can be large, particularly during prolonged (Long Runs) and high intensity sessions (Interval Runs or Fartlek Runs) completed in warm conditions. When fluid intake is less than sweat loss, a body water deficit, or dehydration occurs. Although individual variation will exist, dehydration (>2%) has been associated with impaired aerobic performance, and thus the ability to maintain running pace. This section provides a guide to inform daily fluid requirements. Fluid recommendations for training are provided as well as tools to monitor your own fluid losses during exercise.

Daily fluid requirements

Normal hydration is typically maintained through habitual eating and drinking practices. The human body has superb biological controls which determine how much fluid is retained or passed as urine. However, fluid requirements are individual and depend on a variety of factors, including body size/composition, personal sweat rate, daily life demands and environmental conditions. Importantly, exercise can disrupt fluid balance. Fluid requirements are increased as the exercise intensity, exercise duration or external temperature increases. It is common for people who exercise to not fully rehydrate afterwards, which can negatively influence future physical and cognitive performance. Therefore, it is recommended that marathon runners monitor their hydration status, recognise the signs of dehydration and adjust fluid intake depending on their needs.

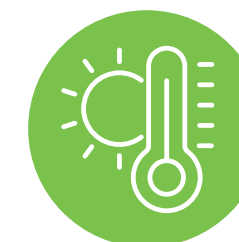
Factors that affect sweat rate



Exercise intensity and duration



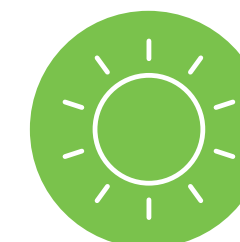
Body Mass



Temperature



Clothing and equipment



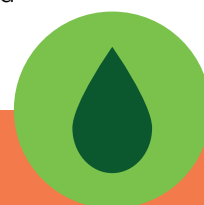
Training and heat acclimation status



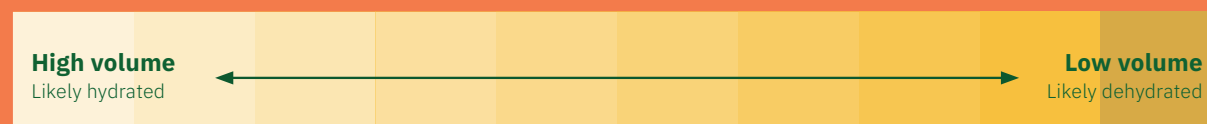


Daily monitoring of hydration

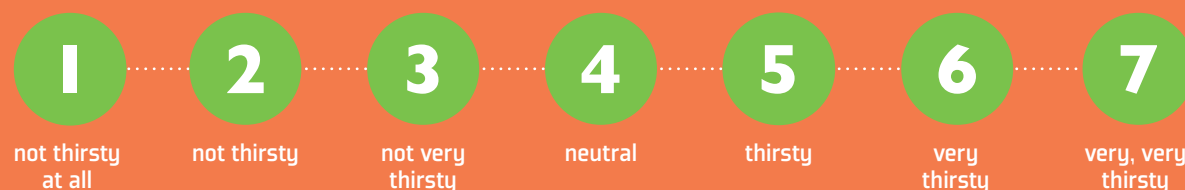
Indicators of hydration status include body weight, urine and thirst. Morning nude body weight can be a useful indicator of hydration status. Normal morning body weight can be established by regular measurements over a duration of several days. This may be particularly useful during tournaments. If body weight has decreased by more than 1% the morning after a prolonged training session, this is likely a consequence of changes in body water. This change could be accompanied by a dark urine colour, low urine volume and feelings of thirst. Therefore, marathon runners can monitor their urine colour, urine volume and how thirsty they feel and use these as indicators of hydration status. Fluid intake can then be adjusted accordingly.



Urine colour chart



How thirsty do you feel now?



Daily fluid intake

All foods and fluids contribute to daily fluid intake. It is recommended to drink with meals to help the retention of the fluid consumed. Most beverages contain >85% water. All beverages contribute to fluid intake, including tea and coffee. The small diuretic effect of caffeine will not offset the overall fluid gain achieved by consuming the drink. However, some drinks are better suited for different occasions. For example, fizzy or highly concentrated drinks are not recommended before or during exercise as they increase the risk of gastrointestinal complaint. It is recommended not to consume caffeinated drinks late in the evening as they may impact your sleep.

Hydration during training sessions

Before exercise

Fluid intake is important before all running activity. The aim is to begin exercise hydrated but avoid feeling bloated or to constantly require the toilet. As a guide, slowly drink beverages (~5–7 mL per kg of body mass) around 4 hours before the start of a training session. This should be combined with the “pre-training meal” to support performance. Consuming fluids at this point will allow time for the body to absorb the fluid required and pass out any excess. If no urine is produced, or the urine is dark or highly concentrated, marathoners can slowly drink more fluid (~3–5 mL per kg of your body mass) about 2 hours before the training session. Fluids, including water and sports drinks such as Gatorade Sports Drink can be used before exercise as these can support both hydration and fuelling requirements.

Pre-Exercise Body Mass		Recommended Fluid Consumption Pre-Exercise Based on Body Mass			
		Millilitres		Equivalence in fluid ounces	
kg	lb	5ml/kg BM	7ml/kg BM	5ml/kg BM	7ml/kg BM
60	132	300	420	10	14
65	143	325	455	11	15
70	154	350	490	12	17
75	165	375	525	13	18
80	176	400	560	14	19
85	187	425	595	14	20
90	198	450	630	15	21
95	209	475	665	16	22
100	221	500	700	17	24
105	232	525	735	18	25
110	243	550	770	19	26

Table 9. Recommended fluid intake prior to exercise based on body mass

During exercise

Acute changes in body mass over the course of exercise can be used to measure fluid lost as a consequence of sweating. It is recommended to measure pre- and post-exercise body mass (in minimal dry clothing or nude, if possible) to calculate individual sweat losses during training of various intensities, durations, and environmental conditions. The boxes on the next page can help marathoners achieve this. The more marathon runners repeat this process, the better profile they can create to build their individual drinking plan.

The aim is to avoid a significant body mass deficit that is larger than 2-3% body weight, which is when decreases in performance may occur especially when running in warm environment. However, it is also strongly recommended marathoners avoid any body mass gain through drinking fluids. If this occurs, marathoners are drinking too much during exercise, and their fluid intake should be reduced accordingly. The formula marathoners can use to calculate their sweat rate during various training sessions is presented on the right side of this page.

Pre-Exercise Body Mass		Body Mass at 2% Dehydration Threshold	
kg	lb	kg	lb
60	132	58.80	129.4
65	143	63.70	140.1
70	154	68.60	150.9
75	165	73.50	161.7
80	176	78.40	172.5
85	187	83.30	183.3
90	198	88.20	194.0
95	209	93.10	204.8
100	221	98.00	216.6
105	232	102.90	227.4
110	243	107.80	238.1

Table 10. Changes in body mass that lead to a 2% dehydration based on different pre-exercise body mass

Figure 3. Sweat rate calculation formula

*Please convert grams to kilograms, millilitres to litres and minutes to hours before calculating sweat rate

Name:

Date:

Pre-exercise body mass

kg

–

Post-exercise body mass

kg

=

Body Mass Loss

kg

Fluid/Bottle Weight Before

ml or g

–

Fluid/Bottle Weight After

ml or g

=

Fluids Consumed

ml or g

Food Weight Before

g

–

Food Weight After

g

=

Food Consumed

g

Urine Loss During Exercise

ml or g

Exercise Duration

mins

Body Mass Loss

kg

+

Fluids Consumed

l or kg

+

Food Consumed

kg

–

Urine Loss During Exercise

l or kg

Exercise Duration

hours

Sweat Rate

=

l/h

Importantly, practicing race fluid intake during training helps the body to better tolerate higher fluid intakes, while also allowing marathoners to improve their ability to consume fluids while running at a high pace, a skill often under-developed in marathon runners.

After exercise

Rehydration is an important part of the post-exercise recovery process. By weighing in and out after exercise, marathoners can calculate their post-exercise fluid requirements. The aim is to completely replace fluid and electrolyte losses prior to the start of the next training session. After exercise, marathoners should sip on water or sports drinks. Allowing 10-15 min for blood to be redistributed from the exercising muscle to the gut before ingesting food or protein shakes is a good practice.

In most situations, water and sodium can be replaced within normal eating and drinking practices with no urgency. Drinking a beverage with sodium or eating sodium-containing snacks/foods helps replace sweat sodium losses, stimulate thirst and retain the ingested fluids. Marathoners should aim to drink **120-150%** of fluid losses after exercise.

Electrolytes

Electrolytes are minerals that play a key role in regulating fluid balance in the body. For hydration, the most important electrolytes are sodium and potassium, as they help control the movement and distribution of water between the bloodstream, tissues, and cells. When you run, your body produces sweat to cool you down, and this sweat contains sodium. The amount of sodium lost in sweat varies considerably between individuals. During exercise, drinking fluids that contain sodium helps to replace these sweat losses, stimulates thirst, and promotes fluid retention. Sports drinks such as Gatorade also provide specific types and quantities of carbohydrate, which promotes fluid absorption in the gut. In practical terms, sodium-containing beverages can encourage greater fluid intake and reduce urine losses, which is especially useful when rapid rehydration is required.

Water remains an important and effective fluid for hydration, particularly during shorter or lower-intensity activity.



Section Summary

Consuming sufficient fluids plays an important role in a marathoner's health and performance. Following pre, during and post exercise hydration guidelines will help marathoners reduce the risk of significant dehydration during exercise which can negatively affect performance, while also helping maintain a daily adequate hydration status.

Body temperature increases during exercise and sweating occurs to dissipate heat from the body. Through sweat, body water and electrolytes, most important sodium, are lost, which can lead to dehydration. Importantly, individuals lose different amounts of water and of electrolytes during exercise. A body mass loss of over **2-3%** during exercise can negatively affect running performance, therefore sufficient fluids need to be consumed to prevent this. A personalised fluid intake that takes into consideration sweat rate and sweat sodium concentration is preferred for maximising the hydration status of marathon runners.



Drink 5-7mL of fluid per kg of body mass



Drink 3-5mL of fluid per kg of body mass (if urine is dark/low in volume)



Individual hydration plan based on the athlete's sweat rate



Drink 120-150% of body mass lost during exercise



ATHLETE PROFILE

Putting Fuelling Science into Practice

(Applied Example)

Name: Katie

Age: 30

Weight: 60 kg

Type of athlete: Competitive Female Marathon Runner

Goal: To PR at the Oslo Marathon, goal time 3:15h

Purpose of consultation: Katie is beginning her training for the Oslo Marathon and would like to develop a fuelling plan specifically for before, during, and after her Long Endurance Runs, which will mimic her race day plan.

Before The Run

Katie plans her Long Runs on Sunday mornings and is willing to wake up two hours prior to eat breakfast. We first suggested 2.5 g carbohydrate/kg body weight, but she felt too full, so we backed down to 2 g/kg and that amount worked well for her stomach. As a result, the carbohydrate goal for her pre-run meal is 120 g. Katie does not like to cook in the morning, and also wants to train with a meal she can travel with and eat before the race. Incorporating Katie's favourite foods, and aiming for a meal low in fiber, protein, and fat, her pre-run meal is: 2 plain bagel with 2 tablespoon strawberry jelly, one small box raisins (~1/4 cup), 500ml Gatorade Sports Drink, water as personally preferred (111 g carbohydrate, 2 g fiber, 9 g protein, and 1 g fat). Katie doesn't like to have too much in her stomach right before the race, but does feel the need for some energy, so we suggest one energy gel/chew to give her a small amount of carbohydrate. During training she will experiment with taking it 5, 10, and 15 minutes before her run to determine what timing works best for her.

During The Run

In training for marathons in the past, Katie would carry 2 gels with her on long training runs and find water fountains along the way. Since her training runs will take ~2.5 hours, two gels (~60 g total carbohydrate) doesn't come close to meeting the recommendation of up to 45-90 g per hour. We don't want her to immediately start consuming 60 g/hour and upset her stomach, so we will start with 30g per hour and gradually increase this amount by 5-10g per hour every Long Run (once per week) and train her stomach to be ready for Marathon Race Day. In terms of fluid, Katie has never figured out her sweat rate. Luckily Katie lives in Oslo, so her training climate will be the same as during the marathon. On a 13-mile Long Run completed at targeted marathon pace, we had her weigh herself immediately before in minimal clothing, and again immediately after in the same clothing, wiping off excess sweat. We also had her carry fluid on the run and measure how much she drank. Katie lost 1kg and drank 600ml fluid during a 100-minute run. Therefore, her sweat rate is 0.8 L/h. Also, during this run, we had Katie wear dark-coloured clothing. There was minimal evidence of salt on her clothes, so higher sodium levels are likely not needed.

For a Long Run lasting ~2h we therefore recommended Katie to consume in total 1.2L fluids in total (0.6L/h) and initially 60g carbohydrate (30g/h), which will be increased each week by 5g of carbohydrate until she reaches an hourly intake between 60-65g, while still being comfortable for her stomach.

After The Run

During training for past marathons, Katie often didn't feel great in her next training sessions after a long run, and she never paid very much attention to what she ate after a run. We helped her understand that recovery nutrition is important so she can stay strong throughout her training and get the most out of every run, as well as maximize training adaptations, such as the ability to store more carbohydrate as muscle glycogen. Katie is hungry after her long training runs, but doesn't feel like her stomach can easily accept food. We recommend she drink a home-made carbohydrate and protein rich smoothie (milk, Greek yoghurt, granola, banana, strawberry and honey) to help support energy restoration, rehydration and muscle repair. Then, after she showers, rests and feels like she can eat solid food again, she can have a meal, which should be high in carbohydrate, moderate in protein, and low in fibre and fat, helping to meet the daily recommendation of 8-10 g/ kg/day (for Katie, 348 - 580 g of carbohydrate). Katie's favourite meal after a long run is a burrito, so we helped her craft an appropriate "recovery burrito" with rice, black beans, chicken, lettuce, tomato and a small amount of cheese. Hopefully with our fluid intake plan during exercise, Katie will lose ~0.4 kg during the Long Run. We therefore recommended her to consume 0.5-0.6 L of fluids in the 1-2h after completing the run. The amount of weight she loses each time will depend on a number of factors, so tracking weight changes is the best habit she can adopt to make sure she is getting what she needs.





Marathon Training Programmes

This toolkit includes **three 16-week Marathon training programmes for Beginner, Intermediate and Advance marathon runners**. All programmes include the different types of training sessions presented in the previous section, and were scientifically developed to allow gradual progressive overload, whilst also including weeks with reduced training load. Importantly, these training plans will help promote the desired physiological adaptations, while minimising the risk of injury.

A rough total weekly mileage that marathon runners will cover as part of each training programme is included. The marathon training plans are accompanied by a description of running experience, fitness status, predicted marathon finished time, etc required for completion. Marathon runners should select based on these the training programme that best suits them, as well as adapt the training plan to suit their own personal requirements and preferences.



MARATHON TRAINING PROGRAMME

Finishers Plan

This plan is designed for those who aim to complete their first ever marathon with the sole goal of being able to cross the finish line. To ensure this plan is suitable for the runner we recommend them to start the plan once they meet the following:

Running history of at least 2-3 months

Consistently run 3 times per week for the last month

Comfortably cover 12 – 15 miles per week

Key Considerations

Injury risk and prevention

Runners that are new to marathon training can face a higher injury risk largely due to the increase in running volume, but also often due to poor load management, insufficient musculoskeletal conditioning and inadequate recovery. Common overuse injuries include tibial stress syndrome, Achilles tendinopathy and patellofemoral pain syndrome ('runner's knee').

Following a structured, progressive marathon training plan that increases weekly mileage and intensity gradually, incorporates sufficient rest days and includes some strength training dedicated to lower limbs and core, may help reduce the risk of injury. An example of such training plan is presented at the end of this section. Furthermore, from a nutrition perspective, an adequate total energy intake is also important to help manage increase in core body temp or help maintain hydration status prolonged low

energy availability, which may help reduce the risk of injury. Marathon runners should refer to the Nutrition chapter to better understand how different running days should be appropriately fuelled.

Physique management

For novice runners, physique management during marathon training is important as body composition influences running economy, mechanical loading and overall injury risk.

Gradual improvements in body composition, such as reduction in excess body fat mass and/or increases in lean mass, can take place during marathon preparation and are beneficial. Importantly, these should take place progressively throughout the duration of marathon training and without compromising appropriate fuelling for training. Marathon runners should avoid restricting dieting during marathon preparation, as prolonged periods of low energy availability, combined with

Plan Structure

Overview of **key considerations** for the Finishers Marathon Training Plan:

Weeks 1 – 4	Establish consistency and with all low intensity volume to minimise injury risk
Week 5	Lower volume to support training adaptation and minimise injury risk
Weeks 6 – 9	Increase in frequency and subsequent volume to increase training adaptation, slight introduction into some intensity
Week 10	Lower volume to support training adaptation and minimise injury risk
Weeks 11 – 13	Final build of increasing volume and specifically the long run
Weeks 14 – 16	Gradual taper to marathon

increased running loads, can impair training performance, recovery, adaptations and can promote an increased risk of injury. Finally, as described in more detail in the Nutrition chapter, runners may also complete fasted runs as a strategy for facilitating physique management.

Ultimately, the improvements that take place during marathon preparation should be the by-product of increased running, additional strength training, improvements in dietary choices and better sleep practices incorporated by marathon runners.

Recovery and rest for facilitating training adaptations

Recovery and rest are key components of marathon preparation in novice runners, as the physiological adaptations that occur in response to training take place during the post-exercise recovery period. For new runners, the musculoskeletal system,

including muscle, bones, tendons, ligaments, etc, require time to adapt to the repetitive loading of running.

Scheduled rest days, lower load training weeks and focusing on optimal post-training strategies can help manage cumulative fatigue and allow tissue repair, facilitating better training adaptations. Marathon runners should also focus on getting sufficient high-quality sleep (as described in the Sleep chapter), as this plays a key role in optimising muscle repair, energy levels and immune function.

Ultimately, novice marathon runners should allow sufficient time for the physiological adaptations to marathon training to fully take place before Race Day, so that accumulated training stress can translate into meaningful performance improvements.





MARATHON TRAINING PROGRAMME

Finishers Plan

WEEKS 1-8



Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Weekly Mileage
1	Rest	35 Min Easy Run	Rest	45 Min Easy Run	Rest Or Strength Train	Rest	6 Mile Long Run	~14 Miles
2	Rest	45 Min Easy Run	Rest	45 Min Easy Run	Rest Or Strength Train	Rest	8 Mile Long Run	~16 Miles
3	Rest	50 Min Easy Run	Rest	50 Min Easy Run	Rest Or Strength Train	Rest	9 Mile Long Run	~18 Miles
4	Rest	50 Min Easy Run	Rest	50 Min Easy Run	Rest Or Strength Train	Rest	11 Mile Long Run	~20 Miles
5	Rest	30 Min Easy Run	Rest	40 Min Steady Run 15-Minutes Easy Running 10 Minutes Steady 15-Minutes Easy	Rest Or Strength Train	Rest	6 Mile Long Run	~12 Miles
6	Rest	40 Min Easy Run	Rest Or Strength Train	40 Min Steady Run 10-Minutes Easy Running, 20 Minutes Steady 10 Minutes Easy Running	30 Min Easy Run	Rest	12 Mile Long Run	~22 Miles
7	Rest	45 Min Easy Run	Rest Or Strength Train	50 Min Steady Run 15-Minutes Easy Running, 20 Minutes Steady 15 Minutes Easy Running	30 Min Easy Run	Rest	13 Mile Long Run	~24 Miles
8	Rest	50 Min Easy Run	Rest Or Strength Train	60 Min Steady Run 10-Minutes Easy Running, 2 X 15 Minutes Steady 5 Minutes Easy 10 Minutes Easy Running	30 Min Easy Run	Rest	14 Mile Long Run	~26 Miles

Table 11. Finisher Marathon Training Plan



MARATHON TRAINING PROGRAMME

Finishers Plan

WEEKS 9-16



Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Weekly Mileage
9	Rest	50 Min Easy Run	Rest Or Strength Train	60 Min Steady Run 15-Minutes Easy Running, 30 Minutes Steady 15 Minutes Easy Running	30 Min Easy Run	Rest	15 Mile Long Run	~28 Miles
10	Rest	30 Min Easy Run	Rest	45 Min Steady Run 15-Minutes Easy Running, 15 Minutes Steady 15 Minutes Easy Running	Rest Or Strength Train	Rest	8 Mile Long Run	~15 Miles
11	Rest	60 Min Easy Run	Rest Or Strength Train	65 Min Tempo Run 10-Minutes Easy Running, 3 X 10 Minutes Tempo 5 Minutes Easy 10 Minutes Easy Running	30 Min Easy Run	Rest	16 Mile Long Run	~30 Miles
12	Rest	60 Min Easy Run	Rest Or Strength Train	65 Min Tempo Run 15-Minutes Easy Running, 2 X 15 Minutes Tempo 5 Minutes Easy 10 Minutes Easy Running	30 Min Easy Run	Rest	18 Mile Long Run	~32 Miles
13	Rest	60 Min Easy Run	Rest Or Strength Train	60 Min Tempo Run 15-Minutes Easy Running, 30 Minutes Tempo 15 Minutes Easy Running	30 Min Easy Run	Rest	20 Mile Long Run This Will Be Your Final Long Training Run. Simulate Race Conditions By Practicing The Same Sleep Routine, Wake Up Time, Pre-Race Diet And In-Race Nutrition And Hydration	~34 Miles
14	Rest	30 Min Easy Run	Rest Or Strength Train	45 Min Steady Run 15-Minutes Easy Running, 15 Minutes Steady 15 Minutes Easy Running	30 Min Easy Run	Rest	12 Mile Run 4 Miles Easy 4 Miles Steady 4 Miles Easy	~21 Miles
15	Rest	30 Min Easy Run	Rest Or Strength Train	40 Min Steady Run 15-Minutes Easy Running, 10 Minutes Steady 15 Minutes Easy Running	30 Min Easy Run	Rest	8 Mile Run 2 Miles Easy Run, 4 Miles Steady, 2 Miles Easy Run	~17 Miles
16	Rest	26 Min Interval Run 10 Minutes Easy 4 X 30s Fast And Controlled 60s Easy 10 Minutes Easy	Rest	Rest	20 Min Easy Run	Rest	Marathon Day	~31 Miles

Table 11. Finisher Marathon Training Plan



MARATHON TRAINING PROGRAMME

Intermediate Plan

This plan is designed for those who aim to break 4 hours in the marathon. To ensure this plan is suitable for the runner we recommend them to start the plan once they meet the following:

Running history of at least 6 months

Consistently run 3-4 times per week for the last month

Comfortably cover 20 – 22 miles per week

Previous experience of completing a marathon or a half marathon

Key Considerations

Fuel and recovery

The increased demands associated with completing the Intermediate Marathon Training Plan make fuelling and recovery key priorities.

Total weekly mileage is higher compared to the Finishers Training Plan, while the addition of Interval Runs results in increased training intensity. Combined, these significantly increase glycogen utilisation, as well as resulting in additional cumulative fatigue. Consuming an adequate carbohydrate intake on a day-to-day basis as indicated in the Nutrition chapter is an important component for maintaining training quality and replenishing muscle and liver glycogen stores following training. Given the increased demands of training with the Intermediate plan, marathon runners are encouraged to consume the higher end of the carbohydrate intake recommendations made in the Nutrition

chapter. As an example, a runner completing the Intermediate Marathon Training Plan could consume on a Long Run Day ~8 g.kg body weight of carbohydrate (recommended intake for this day is 6-10 g.kg body weight). Marathon runners completing the Intermediate Training Plan should also ensure an optimal protein intake and may choose to consume 1.4-1.5. g.kg body weight of protein to support optimal post-exercise recovery and training adaptations.

Ultimately, focusing on optimal fuelling and recovery allows runners to tolerate the increased training loads, recover and adapt optimally to the training completed, arriving at Race Day ready to run a sub 4-hour Marathon.

Dietary supplementation

Marathon runners completing the Intermediate Training Plan may also choose to consider the use of dietary supplements

Plan Structure

Overview of **key considerations** for the Intermediate Marathon Training Plan:

Weeks 1 – 4	Establish consistency and gradual increase in low intensity run volume
Week 5	Lower volume to support training adaptation and minimise injury risk
Weeks 6 – 9	Interval runs introduced and long run progressed
Week 10	Lower volume to support training adaptation and minimise injury risk
Weeks 11 – 13	Race specific intensity work
Weeks 14 – 16	Gradual taper into race day

to support their training, recovery and health. Examples include the use of caffeine or nitrates (e.g. beetroot juice) to acutely support training performance, or the use of protein powders for meeting daily protein requirements and facilitating optimal exercise recovery and adaptations.

Any dietary supplement program should be completed with an experienced and qualified sports nutrition professional. Importantly, it is the responsibility of the runner to ensure that they use appropriate dietary supplements and minimise the risk of consuming prohibited substances.

Any supplement use should be assessed with a qualified healthcare or nutrition professional and is subject to individual responsibility and applicable regulatory guidance.

Race nutrition plan and GI distress

Practicing their race nutrition plan in training during the Long Runs represents a key

priority for intermediate marathon runners, as this will allow them to gradually ‘train their gut’, a key adaptation which can help support Race Day. By regularly consuming carbohydrates during training, marathoners can improve their stomach ability to absorb and tolerate higher amounts of carbohydrates, reducing the risk of gastro-intestinal distress such as bloating, cramping or nausea. Furthermore, practicing their race nutrition strategy during training also allows marathon runners to identify personal preference for the type, quantity and frequency of fluids and carbohydrate sources that best suits them.

Without this regular practice, marathoners can be at an increased risk of such GI distress during the Marathon Race when running intensity and nervous system activation are increased.



MARATHON TRAINING PROGRAMME

Intermediate Plan

WEEKS 1-8



Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Weekly Mileage
1	Rest	45 Min Easy Run	50 Min Steady Run 15 Minutes Easy Running 20 Minutes Steady 15 Minutes Easy	Rest Or Strength Train	Rest Or Strength Train	Rest	8 Mile Long Run	~22 Miles
2	Rest	45 Min Easy Run	55 Min Steady Run 20 Minutes Easy Running, 20 Minutes Steady 15 Minutes Easy	Rest Or Strength Train	Rest Or Strength Train	Rest	9 Mile Long Run	~24 Miles
3	Rest	45 Min Easy Run	60 Min Steady Run 20 Minutes Easy Running, 20 Minutes Steady 20 Minutes Easy	Rest Or Strength Train	Rest Or Strength Train	Rest	10 Mile Long Run	~26 Miles
4	Rest	45 Min Easy Run	60 Min Steady Run 20 Minutes Easy Running 20 Minutes Steady 20 Minutes Easy	Rest Or Strength Train	Rest Or Strength Train	Rest	12 Mile Long Run	~28 Miles
5	Rest	Rest	45 Min Steady Run 15-Minutes Easy Running, 15 Minutes Steady 15 Minutes Easy	Rest Or Strength Train	Rest Or Strength Train	Rest	7 Mile Long Run	~15 Miles
6	Rest	45 Min Easy Run	60 Min Interval Run 15-Minutes Easy Running, 3 X 5 Minutes Hard Followed By 5 Minutes Easy 15 Minutes Easy	Rest Or Strength Train	30 Min Easy Run	Rest	13 Mile Long Run	~29 Miles
7	Rest	45 Min Easy Run	60 Min Interval Run 15-Minutes Easy Running, 3 X 6 Minutes Hard Followed By 4 Minutes Easy 15 Minutes Easy	Rest Or Strength Train	30 Min Easy Run	Rest	15 Mile Long Run	~31 Miles
8	Rest	45 Min Easy Run	65 Min Interval Run 15-Minutes Easy Running, 4 X 5 Minutes Hard Followed By 5 Minutes Easy 10 Minutes Easy	Rest Or Strength Train	30 Min Easy Run	Rest	16 Mile Long Run	~32 Miles

Table 12. Intermediate Marathon Training Plan



MARATHON TRAINING PROGRAMME

Intermediate Plan

WEEKS 9-16



Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Weekly Mileage
9	Rest	45 Min Easy Run	65 Min Interval Run 15-Minutes Easy Running, 4 X 6 Minutes Hard Followed By 4 Minutes Easy, 10 Minutes Easy	Rest Or Strength Train	60 Min Easy Run	Rest	17 Mile Long Run Last 2 miles at marathon pace	~33 Miles
10	Rest	Rest	40 Min Easy Run	Rest Or Strength Train	40 Min Steady Run 15 Minutes Easy, 10 Minutes Steady, 15 Minutes Easy	Rest	10 Mile Long Run	~18 Miles
11	Rest	45 Min Easy Run	62 Min Tempo Run 15-Minutes Easy Running 2 X 12-Minutes Tempo Followed By 4-Minutes Easy, 15-Minutes Easy Running	Rest Or Strength Train	60 Min Easy Run	Rest	18 Mile Long Run	~34 Miles
12	Rest	45 Min Easy Run	65 Min Tempo Run 15-Minutes Easy Running, 15-Minutes Tempo, 5-Minutes Easy, 10 Minutes Tempo 5 Minutes Easy, 15-Minutes Easy Running	Rest Or Strength Train	60 Min Easy Run	Rest	20 Mile Long Run Middle 4 miles at marathon pace	~37 Miles
13	Rest	45 Min Easy Run	70 Min Tempo Run 15-Minutes Easy Running, 2 X 15 Minutes Tempo Followed By 5 Minutes Easy 15 Minutes Easy	Rest Or Strength Train	60 Min Easy Run	Rest	22 Mile Long Run Last 6 miles at marathon pace. This will be your final long training run. Simulate Race conditions by practicing the same sleep routine, wake up time, pre-race diet and in-race nutrition and hydration. Also practice any dietary supplements that are planned for Race Day	~40 Miles
14	Rest	Rest	40 Min Easy Run	Rest Or Strength Train	45 Min Steady Run 15 Minutes Easy, 15 Minutes Steady, 15 Minutes Easy	Rest	12 Mile Run 4 miles easy, 4 miles marathon pace, 4 miles easy.	~21 Miles
15	Rest	Rest	45 Min Steady Run 15 Minutes Easy, 15 Minutes Steady, 15 Minutes Easy,	Rest Or Strength Train	45 Min Easy Run	Rest	8 Mile Run 2 miles easy run, 4 miles half marathon pace, 2 miles easy run	~17 Miles
16	Rest	26 Min Interval Run 10 Minutes Easy 4 X 30s Fast And Controlled 60s Easy 10 Minutes Easy	Rest	Rest	20 Min Easy Run	Rest	Marathon Day	~31 Miles

Table 12. Intermediate Marathon Training Plan



MARATHON TRAINING PROGRAMME

Advanced – Sub 3 Training Plan

This plan is designed for advanced runners looking to complete a marathon in under 3 hours. To ensure this plan is suitable for the runner we recommend them to start the plan once they meet the following:

- Running history of at least 1 year
- Consistently run 4-5 times per week for the last month
- Comfortably cover 30 – 35 miles per week
- Completed either an under 4-hours marathon or under 1.5h half-marathon previously

Key Considerations

Fuel and recovery

Marathon runners completing the Advanced Marathon Training Plan will be completing high mileage weeks on a regular basis. On top of this, the weekly completion of high-intensity sessions such as Interval and Hill Runs will lead to increased cumulative fatigue and higher carbohydrate requirements. Focusing on consuming an optimal amount of carbohydrate on a day-to-day basis (as indicated in the Nutrition chapter) is therefore an important component for advanced marathoners for maintaining training quality and replenishing muscle and liver glycogen stores following training. Given the increased demands of training with the Advanced plan, marathon runners are encouraged to consume the higher end of the carbohydrate intake recommendations made in the Nutrition chapter. As an example, a runner completing the Advanced Marathon Training Plan could consume on a Long Run Day **9-10 g.kg** body weight of carbohydrate (recommended intake for this day is **6-10 g.kg** body weight). Similarly,

advanced marathon runners should also target a higher hourly carbohydrate intake (**55-60g**) during the Long Runs. Last, marathon runners completing the Advanced Training Plan should also ensure an optimal protein intake and may choose to consume **1.4-1.5 g.kg** body weight of protein to support optimal post-exercise recovery and training adaptations.

Advanced marathon runners may also benefit from focusing on nutrient timing. Attention should be paid to pre and during run carbohydrate intake to ensure optimal fuelling for high-intensity and long duration runs, as well as to immediate post-run carbohydrate and protein intake for supporting glycogen resynthesis and stimulating muscle protein synthesis, key drivers of post-run recovery.

Dietary supplementation

Marathon runners completing the Advanced Training Plan may also benefit from the use of dietary supplements to support their training, recovery and health. Examples include the use

Plan Structure

Overview of **key considerations** for the Advanced Marathon Training Plan

Weeks 1 – 4	Interval training (vo2 max focused) and fartlek to develop speed with gradual volume progression
Week 5	Lower volume to support training adaptation and minimise injury risk
Weeks 6 – 9	Intervals switch to tempo runs and hill training introduced whilst maintaining long run progression
Week 10	Lower volume to support training adaptation and minimise injury risk
Weeks 11 – 13	Race specific intensity work
Weeks 14 – 16	Gradual taper into race day

of caffeine and/or nitrates (e.g. beetroot juice) to acutely support training performance, or the use of protein powders for meeting daily protein requirements and facilitating optimal exercise recovery and adaptations. Additionally, if advance runners plan on utilising caffeine and/or nitrates supplements on Race Day, it is particularly important that these supplements are trialled regularly during training so that runners can establish supplementation protocols (dose, timing, type of product, etc) that works best for themselves.

Any dietary supplement program should be completed with an experienced and qualified sports nutrition professional. Importantly, it is the responsibility of the runner to ensure that they use appropriate dietary supplements and minimise the risk of consuming prohibited substances.

Race nutrition plan and GI distress

The increased running intensity and nervous system activation associated with Marathon

Race Day in advanced runners can lead to GI distress, particularly when higher doses of carbohydrates are consumed. To reduce the risk of GI distress, advanced marathon runners should focus during training on practicing their race hydration and fuelling strategy, particularly on Long Runs Days. This includes practicing the carbohydrate loading protocol, pre-race meal and fluid intake, as well as in-race fuelling and hydration. Practising these strategies regularly will allow marathon runners to both ‘train their gut’ (process described in more detail in the Nutrition Chapter), as well as to refine these strategies based on personal tolerance and preferences.

Without this regular practice, advanced marathoners can be at an increased risk of GI distress during the Marathon Race, or may fail to consume sufficient carbohydrate, with both outcomes having the potential to negatively impact their performance and prevent them from breaking the 3-hour mark.



MARATHON TRAINING PROGRAMME

Advanced – Sub 3 Training Plan

WEEKS 1-8



Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Weekly Mileage
1	Rest	45 Min Easy Run	62 Min Interval Run 15-Minutes Easy Running, 4 X 4-Minutes Moderate-Hard Followed By 4-Minutes Easy, 15-Minutes Easy Running	Rest Or Strength Train	50 Min Fartlek Run	40 Min Easy Run	10 Mile Long Run	~33 Miles
2	Rest	45 Min Easy Run	70 Min Interval Run 15-Minutes Easy Running, 4 X 5-Minutes Moderate-Hard Followed By 5-Minutes Easy, 15-Minutes Easy Running	Rest Or Strength Train	55 Min Fartlek Run	40 Min Easy Run	11 Mile Long Run	~35 Miles
3	Rest	45 Min Easy Run	70 Min Interval Run 15-Minutes Easy Running, 5 X 4-Minutes Hard Followed By 4-Minutes Easy, 15-Minutes Easy Running	Rest Or Strength Train	60 Min Fartlek Run	40 Min Easy Run	13 Mile Long Run	~38 Miles
4	Rest	45 Min Easy Run	75 Min Interval Run 15-Minutes Easy Running, 5 X 5-Minutes Hard Followed By 5-Minutes Easy, 10-Minutes Easy Running	Rest Or Strength Train	60 Min Fartlek Run	40 Min Easy Run	14 Mile Long Run	~40 Miles
5	Rest	40 Min Easy Run	50 Min Steady Run 15-Minutes Easy Running, 10 Minutes Steady, 15 Minutes Easy	Rest Or Strength Train	45 Min Easy Run	Rest Day	7 Mile Long Run	~21 Miles
6	Rest	50 Min Easy Run	62 Min Hill Run 25-Minutes Easy Running, 8 X 30s Fast Uphill 60s Walk Downhill, 25 Minutes Easy	Rest Or Strength Train	62 Min Tempo Run 15-Minutes Easy Running, 2 X 12 Minutes Tempo 4 Minutes Easy 15 Minutes Easy	45 Min Easy Run	15 Mile Long Run	~41 Miles
7	Rest	50 Min Easy Run	65 Min Hill Run 25-Minutes Easy Running, 10 X 30s Fast Uphill 60s Walk Downhil, 25 Minutes Easy	Rest Or Strength Train	63 Min Tempo Run 15-Minutes Easy Running, 2 X 15 Minutes Tempo 4 Minutes Easy 10 Minutes Easy	45 Min Easy Run	16 Mile Long Run	~43 Miles
8	Rest	50 Min Easy Run	65 Min Hill Run 25-Minutes Easy Running, 10 X 30s Fast Uphill 60s Walk Downhil,L 25 Minutes Easy	Rest Or Strength Train	65 Min Tempo Run 15-Minutes Easy Running, 20 Minutes Tempo, 5 Minutes Easy, 15 Minutes Tempo, 4 Minutes Easy 6 Minutes Easy	45 Min Easy Run	18 Mile Long Run	~45 Miles

Table 13. Advanced – Sub 3 Training Plan



MARATHON TRAINING PROGRAMME

Advanced – Sub 3 Training Plan

WEEKS 9-16

Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Weekly Mileage
9	Rest	50 Min Easy Run	66 Min Hill Run 25-minutes easy running 8 x 45s fast uphill 75s walk downhill 25 minutes easy	Rest Or Strength Train	60 Min Tempo Run 15-minutes easy running, 30 minutes tempo, 15 minutes easy	45 Min Easy Run	20 Mile Long Run	~46 Miles
10	Rest	30 Min Easy Run	45 Min Easy Run	Rest Or Strength Train	40 Min Steady Run 15 minutes easy, 10 minutes steady, 15 minutes easy	Rest Day	10 Mile Long Run	~23 Miles
11	Rest	45 Min Easy Run	74 Min Tempo Run 15-minutes easy running, 20 minutes tempo, 4 minutes easy, 12 minutes tempo, 3 minutes easy, 8 minutes tempo, 2 minutes easy, 10-minutes easy running	Rest Or Strength Train	65 Min Steady Run	35 Min Easy Run	20 Mile Long Run Last 5 miles marathon pace	~46 Miles
12	Rest	45 Min Easy Run	79 Min Tempo Run 15-minutes easy running, 20 minutes tempo, 4 minutes easy, 15 minutes tempo, 3 minutes easy, 10 minutes tempo, 2 minutes easy, 10-minutes easy running	Rest Or Strength Train	65 Min Steady Run	35 Min Easy Run	20 Mile Long Run 8 miles in the middle at marathon pace	~47 Miles
13	Rest	45 Min Easy Run	80 Min Tempo Run 15-minutes easy running, 2 x 20 minutes tempo, 5 minutes easy, 15-minutes easy running	Rest Or Strength Train	65 Min Steady Run	35 Min Easy Run	22 Mile Long Run 4 miles easy, 6 miles marathon pace, 2 miles easy, 6 miles marathon pace, 4 miles easy This will be your final long training run. Simulate Race conditions by practicing the same sleep routine, wake up time, pre-race diet and in-race nutrition and hydration.	~49 Miles
14	Rest	30 Min Easy Run	45 Min Easy Run	Rest Or Strength Train	60 Min Steady Run 15-minutes easy running, 2 x 10 minutes tempo, 5 minutes easy, 15 minutes easy	Rest Day	14 Mile Run 5 miles easy, 4 miles marathon pace, 5 miles easy	~32 Miles
15	Rest	30 Min Easy Run	40 Min Interval Run 10-minutes easy running, 2 x 5 minutes moderate 5 minutes easy, 10 minutes easy	Rest Or Strength Train	35 Min Easy Run	Rest Day	8 Mile Run 2 miles easy run, 4 miles half marathon pace, 2 miles easy run	~20 Miles
16	Rest	26 Min Interval Run 10 Minutes Easy, 4 X 30s Fast And Controlled 60s Easy, 10 Minutes Easy	Rest	Rest	25 Min Easy Run	Rest	Marathon Day	~32 Miles

Table 13. Advanced – Sub 3 Training Plan



Race Day Strategies

The nutrition and training strategies outlined in this toolkit represent the foundation for an effective marathon preparation. However, in the lead up to Marathon Race Day, runners also need to effectively adjust their training and nutrition to ensure that they start the race with minimal fatigue, optimal energy stores and in a well hydrated state.

A detailed description of the key practical considerations, including running load, nutrition and hydration, that marathon runners should consider prior to Race Day, is presented in the GSSI Marathon Race Day Toolkit: [\(Link to be added once toolkit is online\)](#).

Applying the strategies displayed in this toolkit will allow all runners, independent of their level, to help achieve their individual marathon goals. From finishing, to running personal best times optimising nutrition and hydration strategies are universal consideration for marathon race day performance. Marathon runners are therefore encouraged to utilise the GSSI Race Day Toolkit in their preparation for their marathon race.

Other Common Considerations for Marathon Runners

There are many other aspects that contribute to supporting training adaptations, post-exercise recovery and long-term improvements in running performance. Although this toolkit does not include a comprehensive description of all performance aspects, some key factors are briefly explained in this section, alongside links for further reading.

Sleep



Sleep represents one of our body's most important biological functions. Getting enough sleep is essential for marathon training, recovery and development as well as for physical and mental health. The sleep recommendation for adults is 7-9 hours. However, marathon runners' sleep requirements are likely to be higher due to the physical demands of marathon training. Several research studies show improved physical performance when athletes regularly sleep **10-12 hours**. Sleep timing is also important as humans should typically be awake during the day and asleep at night. The key for sleep timing is consistency in wake and sleep times. Last, sleep quality also plays a key role alongside sleep duration. Consistently applying good sleep hygiene techniques can beneficially impact sleep quality. Napping may also be beneficial for marathon runners who have to routinely wake up early for training/life demands, or those experiencing sleep disturbances. As a guide, naps should be no more than 30 minutes in duration so that runners don't fall into the deeper stages of sleep.

Marathoners interested in learning more about the importance of sleep and good sleep hygiene techniques can review the following **GSSI Sport Science Exchange article: Sleep and Athletes - Gatorade Sports Science Institute**.

Recovery Strategies



Marathon training, alongside the demands of daily life, causes physiological and psychological fatigue for a runner. Allowing marathoners to experience a level of stress, causing fatigue, overload and/or overreaching, is essential to drive adaptations and for enhancing running performance over time.

Adequate recovery following running allows the restoration of physiological and psychological processes, allowing runners to train repeatedly at an appropriate level. On the other hand, continued inadequate recovery may lead to prolonged impaired performance and symptoms of maladaptation. Recovery is therefore recommended to be a regular component of a marathon runner's training schedule. Although this guide does not provide a comprehensive description of all existent recovery modalities, some key recovery strategies that may be considered by marathon runners include appropriate rest and sleep, nutrition and hydration, as well as stretching and mobility exercises, and exposure to warm and/or cold temperatures (e.g. cold or warm baths, cryotherapy or sauna, etc).

Marathon runners interested in further reading about modalities for supporting post-exercise recovery are directed to the **GSSI Sports Recovery Toolkit (gssi-sports-recovery-toolkit-full.pdf)**.

Caffeine



If used appropriately, caffeine can enhance performance by reducing perception of effort and maintaining running intensity. There are a variety of methods to consume caffeine, including capsules, chews, gels, coffee and other beverages. To gain the ergogenic potential, it is recommended to consume a dose of 3-6mg/kg body weight around 60 minutes prior to the training session/competition. For most runners, this results in a caffeine dose of 200-300mg. Caffeine peaks in the blood around 60 minutes post-ingestion but can have a half-life ranging from 3-7 hours. Therefore, for training sessions or during marathon races lasting over 3 hours it may be advantageous to consume a top up dose (~75-100mg) of caffeine in the later stages of the session (100-120 mins into session). This is particularly useful if runners are planning on supplementing with caffeine during the Marathon Race, allowing them to experiment with this strategy in training and minimise the risk of experiencing any adverse side effects during the race.

Glossary of key terms used in this guide

aerobic base = the body’s ability to produce energy using oxygen, primarily through oxidative metabolism, allowing steady- running to be performed for a prolonged period

critical speed = the maximum speed that a runner can maintain for an extended period of time

fuelling = the intentional consumption of carbohydrates before, during and after exercise to support exercise performance and promote post-exercise recovery

lactate threshold = the exercise intensity at which the blood concentration of lactate begins to increase rapidly.

maximal aerobic capacity = the maximum rate at which the body can utilize oxygen during intense exercise. Also commonly referred to as VO2max.

maximum heart rate = the highest number of beats per minute (bpm) the heart can achieve during maximum physical exertion.

muscle protein synthesis = the metabolic process through which amino acids are incorporated into bound skeletal muscle proteins.

glycogen synthesis = the metabolic pathway that converts glucose into glycogen for energy storage, primarily occurring in the liver and skeletal muscle.

rate of perceived exertion = a subjective scale, from 0–10 or 6–20, developed by Gunnar Borg to measure exercise intensity based on how hard you feel your body is working, accounting for heart rate, breathing, and fatigue.

running economy = the energy demand for a given submaximal running speed.

training the gut = the process of conditioning the gastrointestinal (GI) tract to better tolerate, digest, and absorb nutrients, most often carbohydrates and fluids during exercise.

pace = the average running speed over a distance. Usually expressed in minutes per mile or mins per kilometre. Conversion Figure 4.



Pacing conversion table

Marathon Time	Kilometres P/H	Minute P/Km	Miles Per Hour	Minutes Per Mile
5:16:30	8.0 kph	7:30	4.97 mph	12:04
4:57:52	8.5 kph	7:04	5.28 mph	11:22
4:41:20	9.0 kph	6:40	5.59 mph	10:44
4:26:31	9.5 kph	6:19	5.90 mph	10:10
4:13:12	10.0 kph	6:00	6.21 mph	9:40
4:01:08	10.5 kph	5:43	6.52 mph	9:12
3:50:10	11.0 kph	5:27	6.84 mph	8:47
3:40:10	11.5 kph	5:13	7.15 mph	8:24
3:31:00	12.0 kph	5:00	7.46 mph	8:03
3:22:33	12.5 kph	4:48	7.77 mph	7:43
3:14:46	13.0 kph	4:37	8.08 mph	7:26
3:07:33	13.5 kph	4:26	8.39 mph	7:09
3:00:51	14.0 kph	4:17	8.70 mph	6:54
2:54:37	14.5 kph	4:08	9.01 mph	6:40
2:48:48	15.0 kph	4:00	9.32 mph	6:26
2:43:21	15.5 kph	3:52	9.63 mph	6:14
2:38:15	16.0 kph	3:45	9.94 mph	6:02
2:33:27	16.5 kph	3:38	10.25 mph	5:51
2:28:56	17.0 kph	3:32	10.56 mph	5:41
2:24:41	17.5 kph	3:26	10.87 mph	5:31
2:20:40	18.0 kph	3:20	11.18 mph	5:22
2:16:07	18.5 kph	3:14	11.50 mph	5:13
2:13:15	19.0 kph	3:10	11.81 mph	5:05
2:09:50	19.5 kph	3:05	12.12 mph	4:57
2:06:35	20.0 kph	3:00	12.43 mph	4:50
2:03:30	20.5 kph	2:56	12.74 mph	4:43
2:00:34	21.00 kph	2:52	13.05 mph	4:36

Figure 4. Marathon pacing conversion table



Key resources

Gatorade Sports Science Institute: www.gssiweb.org

GSSI Sports Nutrition Toolkit: [GSSI Sports Nutrition Toolkit - Gatorade Performance Partner](#)

Recovery tool kit: [gssi-sports-recovery-toolkit-full.pdf](#)

Marathon race day tool kit

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