



wattbike
www.wattbike.com

TRAINING GUIDE



Eddie Fletcher

Consultant Sport & Exercise Physiologist



Eddie is recognised as a scientific coach adept at explaining sport scientific concepts in a simple, practical and understandable way, and has been intimately involved with the development of Wattbike over the last few years. He has travelled the world demonstrating the Wattbike and use of Wattbike Expert software to sports scientist, cycling coaches and individual cyclists at the highest levels.

His sport and exercise experience encompasses physiological testing of runners, swimmers, cyclist and rowers and the provision of suitable training programmes based on physiological response to improve performance.

Eddie has been involved with indoor rowing for the last 15 years and has developed a unique approach to the coaching and development of specialist indoor rowers which he has now extended to triathletes and individual runners, cyclists and swimmers.

Over the years his rowers have won over 75 medals at the British Indoor Rowing Championships, set British and World records and won European and World titles.

His stable of duathletes/triathletes show remarkable improvement under his guidance with many achieving age group European and World age group qualification.

Eddie is a world expert and pioneer in the practical use and interpretation of heart rate variability (HRV) technology and software to measure the psychological and physiological effect of training and recovery on the human body.

He collaborated with Dr Pete Cunningham of the GB Olympic Sailing Team to produce an Indoor Rowing Sailing Guide (includes physiological profile of all the major Sailing Classes) and with Professor Alison McConnell of Brunel University to produce a POWERbreathe Guide for Rowers. He also wrote the Indoor Rowing Marathon Plan and the Suunto Running Guide.



Contents

Introduction	7
Bike Fit	9
Which Wattbike	21
What's the difference?	21
How to choose the right Wattbike for you	21
Using the Wattbike	23
Using Watts	23
Polar View	24
Power, Resistance and Cadence Tables	25
Wattbike Pro	25
Wattbike Trainer	26
Gearing and Cadence	26
What is a gear?	26
Standard gear metre table	28
Standard metric gear table	29
What are gear inches?	30
Imperial gear table	31
Imperial gear table - Pro and Trainer	32
Getting Started	33
What you need to know to train on the Wattbike.....	33
To use a Wattbike effectively you need to know or estimate your:	33
Heart Rate and Power Training Zones	34
Estimating Maximum Heart Rate (MHR) and Maximum Minute Power (MMP).....	37
Power to Weight Ratio	38
What is power to weight ratio [P/Kg]?.....	38
Why measure power to weight ratio [P/Kg]?	38
The basic science of power to weight ratio [P/Kg]?.....	39
What is a typical power to weight ratio?	39
How to improve power to weight ratio [P/Kg].....	40
Wattbike ranking.....	40
Test Yourself.....	41
5 Fitness Levels	41
Using High and Low Resistance Settings	43
Warm Up and Cool Down	44
Warm up.....	44
Recommended warm ups	44
The 20 minute warm up for technique	45
Warm up on the Wattbike Pro	45
Warm up on the Wattbike Trainer	46
Recommended cool downs	47
Rest and Recovery	48
Illness.....	48
The Recovery, Zone 1 and Zone 2 rule.....	48
Under recovery	48
Heat/cold/humidity	49

Neuromuscular and DOMS (Delayed Onset Muscle Soreness)	49
The benefits of measuring recovery	49
The link between Training Zones and Recovery	50
General guidelines	51
Effective training	52
Physiological Limits	53
Age decline	53
Summary	54
Fluid And Carbohydrate Intake Before, During And After Training	55
Fluid intake during training	55
Carbohydrate intake required during and after training	55
Cycling Tests	57
3 Minute aerobic test	58
10 Minute progress check	58
Ramp tests	58
20 Minute high percentage of maximum minute power test	59
3 Minute Aerobic Test	60
Conducting the 3 Minute Aerobic Test	60
Air Resistance Setting and Cadence Recommendations - 3 Minute Aerobic Test	62
10 Minute Progress Test	65
Conducting the Wattbike 10 Minute Progress Check	65
Ramp Tests	67
The Storer Test	67
Air Resistance Setting and Cadence Recommendations - Storer Test on a Wattbike Pro	69
Air Resistance Setting and Cadence Recommendations - Storer Test on a Wattbike Trainer	70
British Cycling Ramp Test	71
Conducting A British Cycling Ramp Test	72
Air Resistance Setting And Cadence Recommendations - British Cycling Test on a Wattbike Pro	74
Male Ramp test on a Wattbike Pro	74
Female Ramp test on a Wattbike Pro	76
20 Minute High Percentage of Maximum Minute Power Test	78
Conducting the 20 minute test	78
Pedalling Technique Test	81
Conducting the Pedalling Technique Test	81
Pedalling Technique Training Sessions	83
Pedalling Technique - What the Polar View Shapes Mean	87
How to read the graph	87
Example shapes	88
Angle of peak force	89
Ten ways to improve your force curve	89
Training Session Terminology	93
Training Plans	96
Sportive Worked Example - Based on a Wattbike Pro	100
Sportive Training Plans	103
Triathlon 16 Week Training Plan	125



Triathlon Plan	128
Week 3 Example	128
16 Week Training Plan Technique Sessions	130
Technique Session Weeks 2-5 - Resistance level 1	131
Technique Session Weeks 7-10 - Resistance level 2.....	132
Technique Session Weeks 12-15 - Resistance level 3	134
Triathlete 16 Week Training Plans	135
Weight Management Training Guide	138
Weight Management Training Plan	146
Warm up/leg speed before all Zone 2 workouts.....	147
Notes page.....	148



Welcome

Welcome to the Wattbike Training guide. This represents the cumulation of over two years of work, monitoring cyclists, triathletes and fitness enthusiasts on the Wattbike, and has been re-written many many times to try and enable the science behind performance to be explained in a way that is accessible to all, without compromising the quality of the content. The bulk of the training guide has been created by Wattbike's resident Sport Scientist, Eddie Fletcher, who has been testing, monitoring and training athletes around the world over the past two years. Each of the performance tests within this guide has been based on providing the answer to a specific question, whether to assess an individual's Maximum Minute Power or to monitor performance without requiring a maximal intensity test. In some cases new testing protocols have been developed as there had never been a testing tool like the Wattbike available before.

The first training programmes that we have included are to help riders prepare for a Sportive and were created by British Cycling Talent Team Manager, Gary Coltman and Eddie Fletcher. Gary has been working with the Wattbike since it was a prototype and has a great understanding of how it can benefit cyclists.

We have recently added our Winter Triathlon Training Plan, designed by Eddie Fletcher, although it is a plan that can be used by anyone wishing to improve their cycling performance. We will continue to develop the training guide and will add new programmes regularly. If you have a suggestion, question or comment about the guide, do not hesitate to email us on info@wattbike.com





Introduction

This Guide is a general guide aimed at a range of Wattbike users who wish to use the Wattbike to improve cycling performance or general fitness and can be used with our online training plans or your own training plan.

Many of the workouts in the training plans can be used by anyone with a desire to improve their general fitness and cycling ability although they are initially aimed at riders training for a Sportive event (or equivalent) and (with the Winter Training Plan) triathletes.

You are recommended to read the whole of this Guide before embarking on your Wattbike training plan.

Familiarise yourself with how the Wattbike works, how to establish your personal heart rate and power training Zones and how to match the resistance levels and cadence for your personal needs.

Make sure you understand all the functions of the Wattbike Performance Computer and how to use Wattbike Expert software to monitor and analyse your Wattbike sessions. You should thoroughly read the Wattbike User Guide that came with your Wattbike and the Beginners Guide to Wattbike Expert Software. You should also download the latest version of the Wattbike Expert and Performance Computer firmware.

In particular make sure you understand what the Polar View shows and how it can be used to monitor and improve your pedalling technique - more information can be found in the Wattbike Polar View section.

The Wattbike measures your absolute mechanical power in Watts (a measure of how quickly work is done). The amount of power produced is measured from the force you apply to the chain through the cranks.

Your Wattbike is factory calibrated and does not need recalibrating. It is very accurate. The mean accuracy of the Wattbike is typically within 2% (-0.42% +/- 1.21%) with retest variance typically better than 1% (0.42% +/- 0.46%) - South Australian Institute of Sport 31/03/2010.

Split down into intermediate ranges the Wattbike accuracy is typically:

Watts	< 100	100-200	200-500	>500
Accuracy	Up to 6%	Within 2%	Within 1.5%	Within 1%

And over the full range within 2%



Within the calibration limits of each individual Wattbike the actual result you achieve may vary slightly from the figures in the tables used in this Guide. The Guide tables are based on our factory tests and assume constant cadence and application of force.

The Wattbike samples data 100 times a second and is recording data for each pedal revolution. It also measures and, in the software, records 39 different cycling parameters. Not all the parameters are visible on the Wattbike Performance Computer (although they are recorded). To view all the parameters use the Wattbike Expert software.

There are a number technical resources available throughout this website which you should use as reference to aid understanding of how the Wattbike works and how to use Wattbike Expert software.



Bike Fit

SECTION 1 – General Wattbike Cycling Position and Set Up	10
Saddle Height	10
Saddle fore/aft Position.....	10
Handlebar Height (Saddle to Handlebar Difference)	11
Handlebar fore/aft Position	11
Notes on Bike Set Up.....	11
Saddle height formula	12
Measuring inseam (without shoes).....	12
Saddle fore/aft	12
Handlebar height (saddle to handlebar differences)	12
Handlebars fore/aft	12
General	13
Crank length	13
SECTION 2 Wattbike specific bike set up measurements.....	14
Wattbike saddle positions	14
Saddle height (Race Saddle).....	14
Wattbike saddle height settings	14
Wattbike saddle height settings with extra-long seat post (extra 10 cm)	16
Handlebar positions (Standard Wattbike handlebars and Drops)	17
Wattbike handlebar height	17
Wattbike handlebar settings	17
Wattbike handlebar settings with extra long stem (extra 10 cms).....	18
Handlebar height (saddle to handlebar differences) based on height.....	19
The overall riding position.....	19
Overall Tribar riding position.....	20
Overall Drops riding position	20



SECTION 1 – General Wattbike Cycling Position and Set Up

It is important that to set up a safe and comfortable cycling position. The correct set-up is crucial to maximise performance, prevent injury and ensure the most comfortable riding position on the Wattbike. Set up takes account of various body shapes, bone length discrepancy, flexibility/core strength and injury history.

The correct sequence for set up is, saddle height, saddle fore/aft position, handlebar height and handlebar fore/aft position.

Before starting, ensure that the saddle is parallel to the floor; use a spirit level if necessary.

Saddle Height

The easiest way to get a rough height for the saddle height is to stand the rider next to the bike with the heel pushed into the back stabiliser, and then lift the saddle up so that the top of the saddle is level with the bony protrusion of the hip.

Sit the rider on the Wattbike and align the crank arms with the seat post, place the heel of the foot on the crank arm nearest the floor – the leg should be straight (but not locked out).



When clipped in (or with feet in the toe clips) and with the pedal at its longest stroke (inline with the seat post) there should approximately 25-30 degrees bend on the knee. The rider should be able to 'drop the ankle'.

Raise/lower the saddle height to get the correct leg position. ALWAYS DISMOUNT THE WATTBIKE BEFORE MAKING ADJUSTMENTS TO THE SADDLE.

Now get the rider to pedal backwards, they should be able to complete rotations with only a slight rocking of hips and without the legs locking out.

Saddle fore/aft Position

With the feet clipped in (or in the toe clips) bring the crank arms parallel to the floor, drop a plumb line from the inside of the knee, in the indentation next to the patella - it should bisect the pedal spindle. Adjust the saddle fore/aft to ensure that the knee is over the pedal spindle.

NOTE – if you need to move the saddle fore/aft severely, you may need to raise/lower the saddle to compensate

The difference between the forward and back positions of the saddle fore/aft adjustment is 6 cm

Handlebar Height (Saddle to Handlebar Difference)

Adjust the handlebar height so that it is no more than 4 to 10 cm lower than the saddle height (depending on fitness and flexibility, a higher handlebar height may be more comfortable) – for general exercise classes the saddle and handlebars should be at the same height - Use a long spirit level from the saddle across to the handlebar to set this height.

Once the handlebar height has been set, check it by asking the rider to lift their hands off the handlebars – they should be able to hold position.

NOTE – with the saddle and handlebar both set at maximum height there is a saddle to handlebar difference of 7 cm – for safety reasons do not go above minimum markings – extra long stems are available which increase the settings by 10 cm.



Handlebar fore/aft Position

Ask your participant to place their hands on top of the handlebars and bring the crank arms parallel to the floor – drop a plumb line from the elbow, it should fall through the inside of the knee, in the indentation next to the patella and should bisect the pedal spindle – adjust handlebars fore/aft to get the correct position. ALWAYS DISMOUNT THE WATTBIKE BEFORE MAKING ADJUSTMENTS TO THE SADDLE OR HANDLEBARS.

An alternative method is to look at the angle of the back which should be at 45° parallel to the floor with an upper arm to torso angle of 90°.

The difference between the forward and back positions of the handlebar fore/aft adjustment is 6 cm.

By following these simple steps the rider will be placed in the optimum position for both comfort and effective cycling technique. Any slight variation in correct set up will alter the alignment of the joints, muscles and subsequently technique. Ensure that you follow these simple steps with every new rider and recap where required with your existing, regular riders.



Notes on Bike Set Up

NOTE 1

There are many variables that influence bike set up from anatomical differences through to equipment differences and event specific set up; individual cyclists may/will know their own set up but for general use and advice to Wattbike users the process outlined above should help to give them a safe cycling position.



NOTE 2

Saddle height formula

Measuring inseam (without shoes)

Stand with back flat against a wall with heels as close to wall as possible. Place a hardback book vertically as far as possible into the inseam with the edge flush against the wall. Make sure the book protrudes out enough to allow measurement from the top edge of the book down to the floor.

Take inseam measurement multiply by 0.885

e.g. Inseam 82 cm X 0.885 = 72.6 cm so saddle height = 72.6 cm above the bottom bracket axle – this ensures that leg is not at full stretch.

Another common formula is to multiply the inseam measurement by 1.09 (this gives a measurement which includes the crank length).

Other multipliers suggested are 1.06 and 1.08, 1.06 for women who flex forward at the hip and 1.08 for men who flex forward through the mid and upper spine.

NOTE 3

Saddle fore/aft

Depending on a cyclist's preference and type of racing back/forward position may vary 10-20 mm

NOTE 4

Handlebar height (saddle to handlebar differences)

British Cycling Guidelines are relative to a cyclists' height:

Rider height (cm)	Saddle-to-handlebar difference (cm)
155	4
165	6
175	8
185	10

NOTE 5

Handlebars fore/aft

Set up varies greatly by event type and aerodynamic position required.



NOTE 6

General

Set up varies depending on the demands of the type of cycling – track sprinters and track endurance riders will differ, MTB, BMX, Cyclo-cross have their own set up differences as do road and time trial cyclists which they may wish to replicate on a Wattbike



SECTION 2 Wattbike specific bike set up measurements

Wattbike saddle positions

Saddle height (Race Saddle)

The Wattbike seat post height = 45 cm with the seat post set at 0. There are 12 cm between the seat post marking 0 and top of the saddle [race saddle]. Maximum seat height = 82 cm (measured from the center of the bottom bracket/crank arm to the top of the saddle [race saddle] along the direction of the seat post)

There are 22 cm between the seat post marking 0 and top of the saddle [race saddle] with the long seat post. Maximum seat height = 92 cm (measured from the center of the bottom bracket/crank arm to the top of the saddle [race saddle] along the direction of the seat post)

The Wattbike seat post angle is 75°

Wattbike saddle height settings

*Total saddle height in cm measured from the center of the bottom bracket/crank arm to the top of the saddle [race saddle] along the direction of the seat post (using saddle height formula - inseam x 0.885 – rounded to nearest 0.5 cm)



Seat tube/stem height in (cm)*	Wattbike stem setting	Total saddle height	Inseam (cm)
45	0	57	64.5
46	1	58	65.5
47	2	59	67
48	3	60	68
49	4	61	69
50	5	62	70
51	6	63	71.5
52	7	64	72.5
53	8	65	73.5
54	9	66	74.5
55	10	67	76
56	11	68	77
57	12	69	78
58	13	70	79.5
59	14	71	80.5
60	15	72	81.5
61	16	73	82.5
62	17	74	84
63	18	75	85
64	19	76	86
65	20	77	88
66	21	78	88
67	22	79	89.5
68	23	80	90.5
69	24	81	91.5
70	Min 25	82	93



Wattbike saddle height settings with extra-long seat post (extra 10 cm)

*Total saddle height in cm measured from the center of the bottom bracket/crank arm to the top of the saddle [race saddle] along the direction of the stem (using saddle height formula - inseam x 0.885 – rounded to nearest 0.5 cm)

Seat tube/stem height in (cm)*	Wattbike stem setting	Total saddle height	Inseam (cm)
45	0	67	76
46	1	68	77
47	2	69	78
48	3	70	79.5
49	4	71	80.5
50	5	72	81.5
51	6	73	82.5
52	7	74	84
53	8	75	85
54	9	76	86
55	10	77	87
56	11	78	88.5
57	12	79	89.5
58	13	80	90.5
59	14	81	91.5
60	15	82	93
61	16	83	94
62	17	84	95
63	18	85	96.5
64	19	86	97.5
65	20	87	98.5
66	21	88	99.5
67	22	89	101
68	23	90	102
69	24	91	103
70	Min 25	92	104



Handlebar positions (Standard Wattbike handlebars and Drops)

Wattbike handlebar height

The Wattbike handlebar post height is 49 cm with the handlebar post set at 0. There are 7 cm between the handlebar post marking 0 and top of the handlebars

Wattbike handlebar settings

*Measured from the centre of the flywheel cage to the top of the handlebars along the direction of the handlebar post the maximum handlebar height it is 74 cm

Handlebar post height (cm)*	Wattbike handlebar post setting	Total handlebar height (cms)
49	0	56
50	1	57
51	2	58
52	3	59
53	4	60
54	5	61
55	6	62
56	7	63
57	8	64
58	9	65
59	10	66
60	11	67
61	12	68
62	13	69
63	14	70
64	15	71
65	16	72
66	17	73
67	18	74



Wattbike handlebar settings with extra long stem (extra 10 cms)

The Wattbike handlebar post height is 49 cm with the handlebar post set at 0. There are 17 cm between the handlebar post marking 0 and top of the handlebars.

*Measured from the centre of the flywheel cage to the top of the handlebars along the direction of the handlebar post the maximum handlebar height it is 84 cm.

Handlebar post height (cm)*	Wattbike handlebar post setting	Total handlebar height (cms)
49	0	66
50	1	67
51	2	68
52	3	69
53	4	70
54	5	71
55	6	72
56	7	73
57	8	74
58	9	75
59	10	76
60	11	77
61	12	78
62	13	79
63	14	80
64	15	81
65	16	82
66	17	83
67	18	84

Handlebar height (saddle to handlebar differences) based on height

*Measured from the top of the saddle to the top of the handlebars

Rider height (cm)	*Saddle-to-handlebar difference (cm)
150	3
155	4
160	5
165	6
170	7
175	8
180	9
185	10
190	11
195	12
200	13

The overall riding position



or



Overall Tribar riding position

A torso to horizontal angle of 1° is optimal (note this is for a triathlon bike as this reduces frontal area and aids airflow over the body), this can be achieved by reducing the torso to lower body angle. However, an acute angle may also reduce pedalling effectiveness and power output.

Much of the rider weight is transferred through the upper arm. An upper arm to torso angle close to 90° with the shoulder directly above the elbow ensures that the weight is transferred through the humerus and skeletal structure. It also helps to get the torso (back) flatter and reduces the work required to support body weight.

If the angle is less than 90° the rider's weight is shifted too far forward compromising bike handling.

An angle greater than 100° shifts the riders weight back onto the saddle which may result in discomfort and injury and also compromise bike handling.



Overall Drops riding position

In the drop position the saddle height and handlebar height should combine to give the rider a relatively flat back position with 7.5 cm to 10 cm between elbow and knee at the 3 o'clock position.





Which Wattbike?

There are two Wattbike models to choose from; the Pro and the Trainer

What's the difference?

Both Wattbikes have the same measurement system, accuracy, monitor and Wattbike Expert software functions and deliver a professional range of cadence/power outputs. The only difference is the resistance range:

The Trainer is low to medium resistance whilst the Pro is medium to high resistance. There is an overlap from the Trainer to the Pro at the medium level. At each equivalent resistance level and cadence the Trainer power output (W) is approximately 57% of the equivalent output on the Pro.

Simply put, if you cycled at 90 cadence on the Wattbike Trainer at resistance level 1 you would produce 85 W and at resistance level 10 225 W. On the Wattbike Pro resistance level 1 at 90 cadence delivers 150 W and at resistance level 10 390 W.

How to choose the right Wattbike for you

The choice is easier to make if your Wattbike is for individual use. If it will be used by others (family members, young adults/children) then the choice invariably will be the Wattbike Trainer as this gives the lower resistance ranges that will be needed for effective exercise by non cyclists.

The Wattbike trainer is the preferred model for most people, as they can use the combination of the air brake and the magnetic brake to replicate any desired power to meet practical exercise and training needs.

If you do not fall into any of the categories below, we would recommend a Wattbike Trainer. If the Wattbike is for individual use then the following guidelines may be of use:

A Wattbike Pro is suitable for you if you:

- Are a male category three cyclist or better
- Are a female category two cyclist or better
- Have a maximum minute power of more than 280 Watts
- Are a male track sprinter (it is also best for most female track sprinters)
- Have a 10 mile time trial time of less than 26 minutes
- Are a triathlete and have a 40k time of less than 1:10 (note if you have a time between 1:10 and 1:15 but are improving then the Wattbike Pro should still be your choice)
- Will be using the Wattbike for cross training for a specific sport (i.e. Rugby, Football, Rowing)



- Will be using the Wattbike to test cyclists or triathletes
- Will be using the Wattbike to test professional sports people (i.e. Rugby, Football, Rowing)
- Will be using the Wattbike for Group Cycle training for Cyclists and Triathletes

You really should consider having at least one Wattbike Trainer and one Wattbike Pro if you:

- Will be using the Wattbike in a rehabilitation facility
- Are a sport scientist and will be testing both sedentary and trained populations
- Are a gym or health club and want to be able to cater for all your members
- Throughout this guide we will indicate when it is appropriate to use the Wattbike Pro or Wattbike Trainer.



Using the Wattbike

This section of the guide details the main features and concepts of the Wattbike. To best understand the tests and training plans which follow you will need to be familiar with each of these sections.

- Using Watts
- The Polar View

Using Watts

The key difference between the Wattbike and every other indoor bike is that the Wattbike accurately measures power output in Watts.

The amount of power produced is measured 100 times per second by a load cell, located on the chain, and is a measurement of the sum of all forces applied to the chain through the cranks. The Wattbike's Performance Computer then displays the power output every 3 seconds, if you are connected to the Wattbike Expert Software every pedal revolution can be seen in real time with data sampling 100 times per second.

This high rate of data sampling means that the force exerted on the cranks can be recorded every 10microseconds (1/100th of a second), allowing the Wattbike's unique Polar View to display how force is being applied at all points in every pedal revolution. This allows the Wattbike to show your pedalling technique as well as your power output.

Accurately measuring power output is the basis for all of the other parameters recorded on the Wattbike, and means that for the first time it is possible to race between indoor bikes and produce accurate and repeatable results. This is true of every session completed on the Wattbike, no matter when or where the session is done; the results will be comparable with all other Wattbike results. This is made possible because the Wattbike is factory calibrated, and is accurate throughout its life.

The accuracy of the data from the Wattbike means that you can monitor your training progress with a higher level of efficacy than ever before. Every session can be monitored for Power, Average Power, Heart Rate, Average Heart Rate (using either a Suunto ANT+ or Garmin ANT+ chest belt), you can also compare your speed, pace or even the force exerted. Whether you're a competitive cyclist, triathlete, cross trainer or just keen to be fit, you can monitor the effectiveness of your training and your power per kilo output (how much power you can produce for every kilo of body weight) using the Wattbike. So, you will now know when you get out to compete that you are fitter and more powerful than ever before, and that will produce better performances.

The other benefit of all that data about your power output is in building confidence. Seeing your improvement over time can be very motivational, as you strive to achieve new personal bests.



The Polar View

One of the unique features of the Wattbike is the ability to monitor your cycling technique as you ride. This is shown as a force curve on the Wattbike Performance Computer known as the Polar View. The Polar View shows the force applied to the pedals and the position of the pedals when applying this force

When cycling, you can play around with the graph – pushing on the left leg will create a large force shape on the left, pushing hard on the right leg will enlarge the graph on the right. You see a percentage beneath each side, telling you how much power each leg is generating. Standing up and altering your cycling technique will produce a change in the graph.

Wattbike Expert Software (version 2.50.42 upwards) automatically calculates the Power to Weight ratio [P/kg] providing the correct weight, in kilograms has been entered in the cyclist's personal file.



Power, Resistance and Cadence Tables

Use the table below to establish the correct power output (in Watts), by resistance setting and cadence (in 5 rpm bands) required for any particular training session. For ease of reference the Watts have been rounded to the nearest 5 W.

Wattbike Pro

Cadence	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10
40	25	30	30	40	45	45	50	50	55	55
45	35	40	40	45	50	55	55	60	60	65
50	40	40	50	55	60	65	70	70	75	80
55	50	50	60	70	75	80	90	95	100	105
60	60	60	70	80	90	100	110	115	120	125
65	70	80	90	100	115	125	135	150	155	160
70	85	90	105	120	135	150	165	175	185	190
75	100	105	130	150	175	185	200	210	225	240
80	115	125	150	170	195	215	235	250	270	280
85	130	145	170	195	225	260	275	295	320	340
90	150	165	200	235	265	300	325	350	375	390
95	175	185	225	265	310	350	375	400	425	450
100	195	215	260	310	355	395	430	465	500	520
105	210	230	295	350	400	445	490	525	565	600
110	245	270	330	395	455	510	555	600	645	675
115	270	310	380	445	515	575	625	675	725	760
120	300	335	410	490	570	640	695	750	810	850
125	330	370	450	545	635	710	775	835	900	945
130	360	405	495	600	705	785	855	925	995	1045



Wattbike Trainer

Cadence	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10
40	15	15	15	20	25	25	25	30	30	30
45	20	20	20	25	30	30	30	35	35	35
50	25	25	25	30	35	35	40	40	45	45
55	30	30	35	40	40	45	50	50	55	55
60	35	35	40	45	50	55	60	65	70	70
65	40	45	50	55	65	70	75	80	85	90
70	50	50	60	70	75	85	95	100	105	110
75	55	60	70	80	95	105	115	120	130	135
80	65	70	85	95	110	125	135	145	155	160
85	75	80	100	115	130	145	160	170	180	190
90	85	95	115	135	150	170	185	200	215	225
95	100	110	130	155	175	200	215	230	245	260
100	110	125	150	175	200	225	245	265	285	300
105	125	140	170	200	230	260	280	300	325	340
110	140	155	190	225	260	290	320	340	365	385
115	155	175	210	250	290	325	355	385	415	435
120	170	190	235	280	325	365	395	430	460	485
125	190	210	260	310	360	405	440	480	513	540
130	210	230	280	340	400	450	490	530	570	595

Gearing and Cadence

The Wattbike measures absolute mechanical power in Watts. The amount of power produced is measured from the sum of all the forces applied to the chain through the cranks. It is important to recognize that the underlying calculations for Speed (kph), pace (1/km) and distance per revolution are standard equations derived from Watts (W).

What is a Gear?

In addition to the measuring technology the basic construction of the Wattbike includes a chain, a 48 chainring and 13 sprocket combination. Fundamental to understanding how the Wattbike relates to cycling is the understanding of what chainrings and sprockets are and do, bike gearing and how the air brake gear lever, in particular can be used to simulate gearing on a bike. We have all heard about and probably used a gear on a bike – but what is a gear and what does it do? Simply a gear determines the distance a bike will travel in one complete pedal revolution. It is dependent on the circumference of the wheels and the size

of the front 'chainring' and the back 'sprocket'

The number of teeth on a chainring or sprocket determines its size. For instance a 52 chainring has 52 teeth; a 14 sprocket has 14 teeth. So you may hear a gear referred to as a 52/14. Chainrings commonly range from 39 teeth to 56 teeth in size (smaller and larger are available) and sprockets 11 teeth to 26 teeth – the combinations depend on the needs of the cyclist. Measuring the distance a bike travels over one complete pedal revolution is known as 'rolling out' and is measured in metres (known as 'gear metres'). Put the bike into gear i.e. 52/14 roll the bike backwards for one complete pedal revolution. The distance between the start and finish position is measured.

Gear Metres can also be calculated from the equation:

$$\text{Gear (m)} = \frac{(\text{Circumference of rear wheel}) (\text{teeth on chainring})}{(\text{teeth on sprocket})}$$

$$\text{Circumference of the wheel} = \text{Diameter of rear wheel} \times \pi$$

Using a standard sprint rim with normal road tubular tyres a 52/14 gear is 7.93 m so in this gear combination the bike moves 7.93 m along the ground for every pedal revolution. Wheel diameter, tyre width and tyre pressure will alter the distance travelled per revolution. The higher the gear the further the bike will travel for one complete pedal revolution. In low gear the bike will not travel as far. A high gear is one which has a high teeth number on the chainring with a low teeth number on the sprocket. Conversely a low gear is one with a low teeth number on the chainring and high teeth number on the sprocket.

However there are many chainring and sprocket combinations available to achieve a particular gear metre. Tables showing gear metres and conversion to equivalent Wattbike settings are shown in Tables 1 and 2.



Table 1 - Standard Gear Metre Table (rolled out metres)

Standard Sprint Rim with normal road tubular tyre

Sprocket size															
	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
39	6.94	6.41	5.95	5.55	5.21	4.90	4.63	4.38	4.16	3.97	3.79	3.62	3.47	3.33	3.20
40	7.12	6.57	6.10	5.69	5.34	5.02	4.75	4.50	4.27	4.07	3.88	3.71	3.56	3.42	3.29
41	7.30	6.74	6.25	5.84	5.47	5.15	4.86	4.61	4.38	4.17	3.98	3.81	3.65	3.50	3.37
42	7.47	6.90	6.41	5.98	5.61	5.28	4.98	4.72	4.48	4.27	4.08	3.90	3.74	3.59	3.45
43	7.65	7.06	6.56	6.12	5.74	5.40	5.10	4.83	4.59	4.37	4.17	3.99	3.83	3.67	3.53
44	7.83	7.23	6.71	6.26	5.87	5.53	5.22	4.95	4.70	4.47	4.27	4.09	3.92	3.76	3.61
45	8.01	7.39	6.86	6.41	6.01	5.65	5.34	5.06	4.80	4.58	4.37	4.18	4.00	3.84	3.70
46	8.19	7.56	7.02	6.55	6.14	5.78	5.46	5.17	4.91	4.68	4.47	4.27	4.09	3.93	3.78
47	8.36	7.72	7.17	6.69	6.27	5.90	5.58	5.28	5.02	4.78	4.56	4.36	4.18	4.01	3.86
48	8.54	7.89	7.32	6.83	6.41	6.03	5.69	5.40	5.13	4.88	4.66	4.46	4.27	4.10	3.94
49	8.72	8.05	7.47	6.98	6.54	6.16	5.81	5.51	5.23	4.98	4.76	4.55	4.36	4.19	4.02
50	8.90	8.21	7.63	7.12	6.67	6.28	5.93	5.62	5.34	5.08	4.85	4.64	4.45	4.27	4.11
51	9.08	8.38	7.78	7.26	6.81	6.41	6.05	5.73	5.45	5.19	4.95	4.74	4.54	4.36	4.19
52	9.25	8.54	7.93	7.40	6.94	6.53	6.17	5.84	5.55	5.29	5.05	4.83	4.63	4.44	4.27
53	9.43	8.71	8.08	7.55	7.07	6.66	6.29	5.96	5.66	5.39	5.14	4.92	4.72	4.53	4.35
54	9.61	8.87	8.24	7.69	7.21	6.78	6.41	6.07	5.77	5.49	5.24	5.01	4.80	4.61	4.44
55	9.79	9.03	8.39	7.83	7.34	6.91	6.53	6.18	5.87	5.59	5.34	5.11	4.89	4.70	4.52
56	9.97	9.20	8.54	7.97	7.47	7.03	6.64	6.29	5.98	5.69	5.44	5.20	4.98	4.78	4.60



Table 2 - Standard Metric Gear Table

Approximate conversion to Wattbike Air Brake Gear Lever settings -Standard Sprint Rim with normal road tubular tyre

Black = Wattbike Pro, Red = Wattbike Trainer

Sprocket size															
	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
39	3/9	2/6	1/4	5.55/3	5.21/2	4.90/1	4.63	4.38	4.16	3.97	3.79	3.62	3.47	3.33	3.20
40	4/10	2/7	1/5	5.69/3	5.34/2	5.02/2	4.75	4.50	4.27	4.07	3.88	3.71	3.56	3.42	3.29
41	4	3/7	1/5	5.84/4	5.47/3	5.15/2	4.86	4.61	4.38	4.17	3.98	3.81	3.65	3.50	3.37
42	5	3/8	2/6	1/4	5.61/3	5.28/2	4.98/1	4.72	4.48	4.27	4.08	3.90	3.74	3.59	3.45
43	5	4/9	2/6	1/5	5.74/4	5.40/3	5.10/1	4.83	4.59	4.37	4.17	3.99	3.83	3.67	3.53
44	6	4/10	3/7	1/5	5.87/4	5.53/3	5.22/2	4.95/1	4.70	4.47	4.27	4.09	3.92	3.76	3.61
45	6	4	3/8	2/6	1/4	5.65/3	5.34/2	5.06/1	4.80	4.58	4.37	4.18	4.00	3.84	3.70
46	7	5	4/9	2/6	1/5	5.78/4	5.46/3	5.17/2	4.91/1	4.68	4.47	4.27	4.09	3.93	3.78
47	8	5	4/10	3/7	1/5	5.90/4	5.58/3	5.28/2	5.02/1	4.78	4.56	4.36	4.18	4.01	3.86
48	9	6	4	3/8	2/6	1/4	5.69/3	5.40/2	5.13/2	4.88	4.66	4.46	4.27	4.10	3.94
49	10	6	5	3/9	2/6	1/5	5.81/4	5.51/3	5.23/2	4.98/1	4.76	4.55	4.36	4.19	4.02
50	10	7	5	4/10	3/7	1/5	1/4	5.62/3	5.34/2	5.08/1	4.85	4.64	4.45	4.27	4.11
51	9.08	8	5	4/10	3/8	2/6	1/5	5.73/4	5.45/3	5.19/2	4.95/1	4.74	4.54	4.36	4.19
52	9.25	9	6	4	3/8	2/6	1/5	5.84/4	5.55/3	5.29/2	5.05/1	4.83	4.63	4.44	4.27
53	9.43	10	6	5	4/9	3/7	1/5	1/4	5.66/3	5.39/2	5.14/2	4.92/1	4.72	4.53	4.35
54	9.61	10	7	5	4/10	3/7	2/6	1/5	5.77/4	5.49/3	5.24/2	5.01/1	4.80	4.61	4.44
55	9.79	9.03	8	6	4	3/8	2/6	1/5	5.87/4	5.59/3	5.34/2	5.11/2	4.89	4.70	4.52
56	9.97	9.20	9	6	5	4/9	3/7	1/5	1/4	5.69/3	5.44/3	5.20/2	4.98/1	4.78	4.60



What are gear inches?

Gear inches is a system that assigns numerical measurements to gear ratios to indicate how low or high a gear is. It has no physical significance. Gear inches relate to the diameter in inches of the main wheel of an old-fashioned penny-farthing with equivalent gearing.

To convert from gear inches to gear metres divide by 0.08 (more exactly: 0.0798, or precisely: 0.0254π). So for example level 1 on the Wattbike is 6.2 metres (at 90 cadence see table 3) or $6.2/0.08 = 77.5$ inches. The difference between gear inches and gear metres is the factor π i.e multiply by 3.142 to get the distance travelled in one pedal revolution.

Level 1 = 6.2 metres

$$\frac{6.2}{0.08} = 77.5 \text{ inches}$$

Gear inches originate from the old-fashioned penny-farthing when crankarms were attached directly to the large drive wheel. One turn of the pedals moved the bicycle a distance equal to the circumference of the wheel.

The larger the wheel the farther the bicycle went for each turn of the pedals. The gear-inch system is a holdover from these early days when wheel diameter determined the bike's gearing. Riding in a high gear on a modern bike is mechanically equivalent to riding a penny-farthing with a large wheel whereas a low gear on a modern bike is the equivalent of a smaller wheel on a penny-farthing.

Gear inches express gear ratios as the diameter of a directly-driven wheel and is calculated as follows: Diameter of drive wheel in inches \times number of teeth on the chainring / number of teeth on the sprocket. The gear inches table is based on a wheel diameter of 27 inches. This means that a 48 teeth chainring/18 teeth sprocket setup is usually considered to be 72 inches. The full gear inches and conversion to equivalent Wattbike settings are shown in Tables 3 and 4.



Table 3- Imperial Gear Table

Sprocket size															
	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
39	87.8	81.0	75.2	70.2	65.8	62.0	58.5	55.4	52.7	50.2	47.9	45.8	43.9	42.1	40.5
40	90.0	83.1	77.2	72.0	67.5	63.5	60.0	56.9	54.0	51.4	49.1	47.0	45.0	43.2	41.5
41	92.3	85.2	79.1	73.8	69.2	65.1	61.5	58.3	55.4	52.7	50.3	48.1	46.1	44.3	42.6
42	94.5	87.2	81.0	75.6	70.9	66.7	63.0	59.7	56.7	54.0	51.6	49.3	47.3	45.4	43.6
43	96.8	89.3	82.9	77.4	72.6	68.3	64.5	61.1	58.1	55.3	52.8	50.5	48.4	46.4	44.7
44	99.0	91.4	84.9	79.2	74.3	69.9	66.0	62.5	59.4	56.6	54.0	51.7	49.5	47.5	45.7
45	101.3	93.5	86.8	81.0	76.0	71.5	67.5	64.0	60.8	57.9	55.2	52.8	50.6	48.6	46.7
46	103.5	95.6	88.7	82.8	77.6	73.1	69.0	65.4	62.1	59.2	56.5	54.0	51.8	49.7	47.8
47	105.8	97.6	90.7	84.6	79.3	74.7	70.5	66.8	63.5	60.4	57.7	55.2	52.9	50.8	48.8
48	108.0	99.7	92.6	86.4	81.0	76.3	72.0	68.2	64.8	61.7	58.9	56.4	54.0	51.9	49.9
49	110.3	101.8	94.5	88.2	82.7	77.8	73.5	69.6	66.2	63.0	60.1	57.5	55.1	52.9	50.9
50	112.5	103.9	96.4	90.0	84.4	79.4	75.0	71.1	67.5	64.3	61.4	58.7	56.3	54.0	51.9
51	114.8	105.9	98.4	91.8	86.1	81.0	76.5	72.5	68.9	65.6	62.6	59.9	57.4	55.1	53.0
52	117.0	108.0	100.3	93.6	87.8	82.6	78.0	73.9	70.2	66.9	63.8	61.1	58.5	56.2	54.0
53	119.3	110.1	102.2	95.4	89.5	84.2	79.5	75.3	71.6	68.2	65.1	62.2	59.6	57.3	55.0
54	121.5	122.2	104.2	97.2	91.1	85.8	81.0	76.8	72.9	69.4	66.3	63.4	60.8	58.3	56.1
55	123.8	114.3	106.1	99.0	92.8	87.4	82.5	78.2	74.3	70.7	67.5	64.6	61.9	59.4	57.1
56	126.0	116.3	108.0	100.8	94.5	89.0	84.0	79.6	75.6	72.0	68.7	65.8	63.0	60.5	58.2



Table 4 - Imperial Gear Table

Approximate conversion to Wattbike Air Brake Gear Lever settings

Black = Wattbike Pro, Red = Wattbike Trainer

Sprocket size															
	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
39	3/9	2/6	1/4	70.2/3	68.8/2	62.0/1	58.5	55.4	52.7	50.2	47.9	45.8	43.9	42.1	40.5
40	4/10	2/7	1/5	72.0/3	67.5/2	63.5/1	60.0	56.9	54.0	51.4	49.1	47.0	45.0	43.2	41.5
41	4	3/7	1/5	73.8/4	69.2/2	65.1/2	61.5	58.3	55.4	52.7	50.3	48.1	46.1	44.3	42.6
42	5	3/8	2/6	1/4	70.9/3	66.7/2	63.0/1	59.7	56.7	54.0	51.6	49.3	47.3	45.4	43.6
43	5	4/9	2/6	1/5	72.6/4	68.3/3	64.5/1	61.1	58.1	55.3	52.8	50.5	48.4	46.4	44.7
44	6	4/10	3/7	1/5	74.3/4	69.9/3	66.0/2	62.5/1	59.4	56.6	54.0	51.7	49.5	47.5	45.7
45	6	4	3/8	2/6	1/4	71.5/3	67.5/2	64.0/1	60.8	57.9	55.2	52.8	50.6	48.6	46.7
46	7	5	4/9	2/6	1/5	73.1/4	69.0/3	65.4/2	62.1/1	59.2	56.5	54.0	51.8	49.7	47.8
47	8	5	4/10	3/7	1/5	74.7/4	70.5/3	66.8/2	63.5/1	60.4	57.7	55.2	52.9	50.8	48.8
48	9	6	4	3/8	2/6	1/4	72.0/3	68.2/2	64.8/2	61.7	58.9	56.4	54.0	51.9	49.9
49	10	6	5	3/9	2/6	1/5	73.5/4	69.6/3	66.2/2	63.0/1	60.1	57.5	55.1	52.9	50.9
50	10	7	5	4/10	3/7	1/5	1/4	71.1/3	67.5/2	64.3/1	61.4	58.7	56.3	54.0	51.9
51	10	8	5	4/10	3/8	2/6	1/5	72.5/4	68.9/3	65.6/2	62.6/1	59.9	57.4	55.1	53.0
52	117.0	9	6	4	3/8	2/6	1/5	73.9/4	70.2/3	66.9/2	63.8/1	61.1	58.5	56.2	54.0
53	119.3	10	6	5	4/9	3/7	1/5	1/4	71.6/3	68.2/2	65.1/2	62.2/1	59.6	57.3	55.0
54	121.5	10	7	5	4/10	3/7	2/6	1/5	72.9/4	69.4/3	66.3/2	63.4/1	60.8	58.3	56.1
55	123.8	114.3	8	6	4	3/8	2/6	1/5	74.3/4	70.7/3	67.5/2	64.6/2	61.9	59.4	57.1
56	126.0	116.3	9	6	5	4/9	3/7	1/5	1/4	72.0/3	68.7/3	65.8/2	63.0/1	60.5	58.2

Getting Started

This section of the training guide is very important to make sure that you understand how to get the most out of the training plans, and the Wattbike. You should read each page carefully before moving on to find out about the tests in the next section.

What you need to know to train on the Wattbike

- Heart Rate and Power Training Zones
- Estimating Maximum Heart Rate (MHR) and Maximum Minute Power (MMP)
- The Importance of Power to Weight Ratio [P/Kg] in Cycling
- Test yourself
- Fitness Levels
- Using High And Low Resistance Settings
- Warm Up And Cool Down
- Fluid And Carbohydrate Intake Before, During And After Training

To use a Wattbike effectively you need to know or estimate your:

- *Maximum minute power – [MMP] in Watts [W]
- *Maximum heart rate- [MHR] in beats per minute [bpm]
- Heart rate and power training Zones
- Range of Wattbike cadence (revolutions per minute [r/m]) and air resistance settings for each training Zone

**The highest average minute power output (in Watts) and highest heart rate achieved during a Wattbike cycling ramp test (usually the final minute)*

You can estimate or find these values by using one of the Wattbike Cycling Tests in this Guide.

Warning

Do not guess any of these requirements, use the tests in this guide to estimate your personal values.

The tests in this Guide assume a high level of basic fitness and should not be attempted if you are a beginner or have been recently ill or injured. If in doubt consult your Doctor before you commence a Wattbike test or training plan. The tests are not suitable for anyone under the age of 18 unless under supervision.



Heart Rate and Power Training Zones

Heart rates are measured by connecting a heart rate monitor to the Wattbike (coded Suunto and Garmin and uncoded Polar [HR receiver required for Polar]).

We have adopted the British Cycling methodology for calculating heart rate and power training Zones. This methodology has been expanded to include a table of recommended Wattbike cadence and air resistance settings to achieve the heart rate and power Zones required.

The training Zones are based on the results of a Wattbike test to find or estimate your maximum minute power and maximum heart rate.

In general a workout where heart rate is 50 beats below maximum heart rate is recovery or base endurance. 30 to 50 beats below maximum is endurance training, 15 to 30 beats below maximum is intensive training and 0-15 beats below is very short high intensity interval training.

Once you have carried out a Wattbike test or used an estimated method to calculate your maximum heart rate you will be able to work out your personal Wattbike air resistance and cadence settings that apply to each of your heart rate and power training Zones using the table provided in this guide.

The key measures you should use to establish (or estimate) your heart rate and power training Zones are:

- Heart rate [bpm]
- Watts [W]
- Cadence [r/m]

This means that it is possible to train with the correct heart rate, power, cadence and air resistance for a training session of known duration/distance and intensity (training Zone). You can choose to train by any combination of heart rate, power, cadence and air resistance setting.



Training Zones are determined by percentage of maximum heart rate, percentage of maximum minute power and duration. Each Training Zone has a different purpose as defined in the following table:

Training Zone	Purpose	% MHR	%MMP		
Recovery	Regeneration and Recovery	<60	<35	1 very relaxed. Able to carry on a conversation.	<60
1. Basic	Establish base endurance	60-65	35-45	2 Relaxed. Able to carry on a conversation	90'-360'
2. Basic	Improve efficiency	65-75	45-55	3 Working. Feel warmer. Heart rate and respiration up. May sweat	60'-240'
3. Intensive	Improve sustainable power	75-85	55-65	5 Hard work. Heart rate and respiration up. Carbon dioxide build up. Sweating. Breathing hard	45'-120'
4. Intensive	Push threshold up	82-89	65-75	6 Stressed. Panting. Sweating freely	30'-60'
5. Maximal	Sustain a high percentage of maximal aerobic power	89-94	75-85	7 Very stressed. Gasping. Sweating heavily	14'-40'
6. Maximal	Increase maximum power output	>94	85-100	10 Heavily stressed. Gasping. Sweating heavily	4'-10' intervals
Supra-maximal	Increase sprint power output	N/A	>100	10 Extremely stressful. Gasping. Sweating heavily	Short intervals

Note that the maximum duration times are those applicable to highly trained elite cyclists with the range designed to reflect beginners to elite cyclists; the durations recommended in the Wattbike training plans reflect the purpose of each particular plan and the amount of time it is sensible to spend on a Wattbike.



The following table summarises the purpose and physiological adaptation of each of the training Zones.

Training Zone	Purpose	Physical Adaptations	Race fitness
Recovery	Regeneration and Recovery	Increase blood flow to muscles to flush out waste products and provide nutrients	Promotes recovery and therefore training response
Zone 1	Establish base endurance	Improves fat metabolism, gets muscles/tendons/ligaments/nerves used to cycling. Increases economy	More efficient use of energy. Prepares body for harder training, works on technique/skill
Zone 2	Improve efficiency	Improves the ability to use oxygen, produce power and increases efficiency	Able to produce more power with the same level of effort, works on technique/skill
Zone 3	Improve sustainable power	Improves carbohydrate metabolism, changes some fast twitch muscle to slow twitch	Improved sustainable power, good for all cycling events
Zone 4	Push threshold up	Improves carbohydrate metabolism, develops lactate threshold, changes some fast twitch muscle to slow twitch	Improved sustainable race pace, useful during tapering or pre-competition periods: too much time in this Zone can cause staleness
Zone 5	Sustain a high percentage of maximal aerobic power	Develops cardiovascular system and VO ₂ max, improves anaerobic energy production and speeds turnover of waste products	Improved time trialing ability and resistance to short-term fatigue
Zone 6	Increase maximum power output		
Supra-maximal	Increase sprint power output	Increases maximum muscle power, develops neural control of pedalling at specific cadence	Develop race-specific skills at race pace, starting power, sprint speed and the ability to jump away from the bunch

Estimating Maximum Heart Rate (MHR) and Maximum Minute Power (MMP)

The only way to determine your cycling maximum heart rate and maximum minute power is by using a properly constructed cycling test.

However such a test requires considerable motivation, physical stress and discomfort and it is inadvisable without medical clearance and supervision, particularly for individuals predisposed to coronary heart disease. We therefore suggest that people consider themselves "average" and use age predicted maximum heart rates despite the inaccuracy of such methods (as much as +/- 20 bpm).

Remember that if you know your running maximum heart rate your cycling max could be 5-10 beats lower.

A number of methods are available (subtract at least 5 beats for cycling):

- $MHR = 220 - \text{your age}$
- $210 - (0.65 \times \text{age})$
- $217 - (0.85 \times \text{age})$

See www.brianmac.co.uk/maxhr.htm for further suggestions.

As you progress in your training adjust your training Zones if you achieve a higher maximum heart rate and, when fit enough arrange to undertake a structured Wattbike cycling test.

To estimate maximum minute power use the average power achieved in a Wattbike 3 minute aerobic test. Exercise caution when undertaking the test for the first time. You can also use the maximum heart rate achieved in this test as your starting point for heart rate calculations (even though this may be inaccurate).

Always err on the side of caution, as you improve you can adjust the heart rate and power training Zones.



Power to Weight Ratio

The Wattbike measures absolute mechanical power in Watts. The amount of power produced is measured from the sum of all the forces applied to the chain through the cranks. One way to utilise the Wattbike's power data is to determine power to weight ratio [P/Kg] and use this information to optimise performance.

What is power to weight ratio [P/Kg]?

Power to weight [P/Kg] ratio is the relationship between:

- Power (measured in watts [W])
- Weight (measured in kilograms [kg])

For example if a cyclist produces a maximum minute power of 350 W during a cycling ramp test and weighs 70 Kgs the power to weight ratio [P/Kg] is expressed as: $P/Kg = 350/70 = 5$ Watts per kilogram of body weight. A cyclist weighing 90 Kgs achieving the same maximum minute power would have a power to weight ratio [P/Kg] of $P/Kg = 350/90 = 3.89$ Watts per kilogram of body weight.

Wattbike Expert Software (version 2.50.42 upwards) automatically calculates the Power to Weight ratio [P/kg] providing the correct weight, in kilograms has been entered in the cyclist's personal file.

Why measure power to weight ratio [P/Kg]

The purpose of measurement is to optimise power to weight ratio relative to a specific task, for example cycling up a hill or during a sprint of short duration (note also the consideration of drag and rolling road resistance where frontal surface area and weight are equally relevant even on a flat road course).

Optimisation can be done in two ways which can be combined:

- Increasing absolute power
- Decreasing weight

Losing weight as a means of improving the ratio is not recommended unless clearly overweight. Dieting to attain an "ideal" cycling weight can be very counter productive. It's not as simple as losing weight, if lean muscle mass is lost absolute power output will be reduced as the means for producing the power has gone.

The best option is to focus on optimising power whilst balancing diet and weight. It is far simpler to maximise power than control body weight. Weight loss can usually be achieved naturally by a structured training and racing program. By focusing on training to maximise power (increasing lean muscle mass) power and weight ratio can be optimised.

The basic science of power to weight ratio[P/Kg]

The best explanation is to consider hill cycling ability. Assume two cyclists of equal ability and identical equipment riding uphill side-by-side. The first cyclist weighs 85 Kgs and has an average power on the climb of 450 watts. The second cyclist weighs 65 Kgs and has an average power on the climb of 380 watts.

Looking at pure absolute power the natural assumption is that the first cyclist would easily beat the second cyclist on this climb because of the 70 watt power difference.

However, power is not the only variable that cyclists have to contend with whilst climbing. Part of a cyclist's climbing power is used to move horizontally in a forward direction and part to overcome the influence of gravity in moving in an uphill direction (i.e. climbing the hill). When weight is taken into account in addition to absolute climbing power the result for each cyclist is:

- Cyclist 1 $P/Kg = 5.29 \text{ W/Kg}$ ($450/85$)
- Cyclist 2 $P/Kg = 5.85$ ($380/65$)

Cyclist 2 in most circumstances would get to the top of the hill first even though cyclist 1 is producing 18% more absolute power than cyclist 2.

What is a typical power to weight ratio

It really depends on the type of cyclist. Sprinters typically have high short duration power output and lower endurance scores whilst endurance cyclists may have low short duration power and high endurance scores. Weight (lean muscle mass) is an advantage for short duration sprint cyclists.

As an example, world class male sprint cyclists typically weigh over 80 Kgs and in some cases over 90 Kgs and are capable of peak power scores in the range 1750-2250 W and max minute power of 360-400W. Conversely world class male endurance cyclists typically weigh closer to 70-75 Kgs and whilst producing lower peak power scores of 1000-1250W have a much higher max minute power score of 420-500W.

World class female sprint cyclists typically weigh 60-65 Kgs with peak power scores of 1000-1500W, world class female endurance cyclist typically weigh well below 60 Kgs with max minute power score of 320-350W.

On a Wattbike we have seen scores within these ranges - the highest peak power score, so far is 2300W (male) and 1600W (female). Testing peak power and maximum minute power on a Wattbike is an easy process. A 6 second Peak Power Test is built into the Wattbike Performance Computer and Maximum Minute Power Ramp Test protocols are easy to construct on a Wattbike and analyse using Wattbike Expert Software.



How to improve power to weight ratio [P/Kg]

In the example above cyclist 1 would need to lose 9 Kgs to increase power to weight ratio to equal that of cyclist 2. A rapid reduction in body weight of this magnitude would result in the loss of lean muscle mass responsible for producing the power in the first place. The better choice would be to focus on increasing absolute power using a structured training program.

The advantage of the Wattbike is the control and immediate, accurate feedback on relevant parameters such as gearing (resistance), cadence (see section on Gearing and Cadence), power output, technique (using the unique Polar Graph facility of the Wattbike Performance Computer and Expert Software) and many other cycling parameters to optimize performance.

The Wattbike Ranking

The Wattbike ranking is a good place to log scores and look at comparisons with other Wattbike users.

- The current peak power ranking has a number of male entries over 1750W with a few over 2000W, for females there are a few entries in the range 1000-1250 W
- For 60 minutes there are a limited number of entries so far but for males a few in the range 300-350 W
- We expect the 60 minute score to improve dramatically as more people attempt 60 minutes on a Wattbike.

Test Yourself

Step 1

Conduct a 3 minute aerobic test, or if you are undertaking Sportive Training Plans 4 and 5 or the Triathlon Winter Training Plan you could use the Fletcher Test (20 minute high percentage of maximum minute power test) and/or one of the ramp tests. Full details of all the test can be found in the Wattbike Cycling Tests section.

Step 2

Record the average power in Watts and the maximum heart rate achieved for the 3 minutes or, the highest average minute power output in Watts and highest heart rate achieved during a ramp test (usually the final minute).

Step 3

Use the experience description or your maximum minute power to decide your fitness level and training plan. The fitness levels equate to the Sportive training plans. For example if you are a beginner with no cycling experience then your fitness level is 1 and you should follow Sportive training plan 1. If you are an experienced cyclist cycling 5 + times a week then you are fitness level 5 and should follow Sportive training plan 5.

Step 4

Apply the power and heart rate training Zones to the specific training plan you are following. Fitter individuals (non cyclists) and experienced cyclists can use just a ramp test in step 1 to establish maximum minute power and maximum heart rate.

There are 5 fitness levels

Level 1 (Beginner) - No previous cycling experience, not currently exercising			
MMP		Power to weight	
M - 240W	F - 160W	M - 2.58W/kg	F - 2.16W/kg

Level 2 (Moderate Fitness) - Informal exercise over the last 12 months			
MMP		Power to weight	
M - 240-290W	F - 160-200W	M - 2.58-3.11W/kg	F - 2.16-2.72W/kg



Level 3 (Active Fitness) - Exercising 2-3 times a week for the last 12 months			
MMP		Power to weight	
M - 290-340W	F - 200-240W	M - 3.11-3.64W/kg	F - 2.72-3.27W/kg

Level 4 (Active Cyclist) - Cycling 2-3 times a week for the last 12 months			
MMP		Power to weight	
M - 340-400W	F - 240-280W	M - 3.64-4.29W/kg	F - 3.27-3.82W/kg

Level 5 (Experienced Cyclist) - Cycling 5 + times a week for the last 24 months +			
MMP		Power to weight	
M - >400W	F - >280W	M - >4.29W/kg	F - >3.82W/kg

Note to the table:

Power to weight ratio is based on males at 70 kg and females at 55 kg using 75% of maximum minute power i.e. $MMP \times 0.75 / \text{weight (kg)}$.

Example:

Male 340 W MMP $\times 0.75 / 70 \text{ kg} = 3.64 \text{ W/kg}$

Female 240 W MMP $\times 0.75 / 55 \text{ kg} = 3.27 \text{ W/kg}$



Using High And Low Resistance Settings

Question:

If a high resistance produces greater power does this mean that it is better always to use a high resistance setting?

Answer:

In a word 'NO' - The air resistance setting is not an indication of how fast you can go – level 10 is not fast and level 1 is not slow. It is not a measure of how difficult it is to complete a workout. A setting of level 10 is not more difficult than an equivalent setting of 1. The same amount of power (Watts) applied to each pedal revolution will produce the same result whether it is applied when using a high air resistance setting or when a lower setting is employed.

In the case of a high resistance setting the power will be applied through a slower movement working against a higher load. Conversely in the case of a lower resistance setting the power is applied more quickly working against a lighter load. For the same power output a lower resistance setting will require a higher cadence but less force. Conversely, a higher resistance setting allows a higher power output for a given cadence but requires more force.

Question:

The optimum cadence (pedal revolutions per minute r/m) is a balance between leg speed and power applied to the pedals.

Answer:

For general exercise the ideal setting is one that allows comfortable pedal spinning at a cadence of between 70-90 pedal revolutions per minute (r/m) – more experienced cyclists may be able to maintain a cadence of 90-110 revolutions per minute (r/m) and trained cyclists in excess of 110 revolutions per minute (r/m) – sprinters can reach 140 +. Depending on the circumstances cadence can vary from 50 to 200 rpm.



Warm Up And Cool Down

Warm up and cool down are very important – although some the tests and some sessions in the Training Plans have warm and cool down recommendations this section is a general guide to the purpose and duration of warm up and cool down for each of the training Zones.

Warm up

The purpose of a warm up is to increase muscle and core temperature, blood flow and improve the uptake, transport and utilisation of oxygen, as well as providing a comfortable way to lead into more vigorous exercise. A warm up should progress gradually and provide sufficient intensity to increase muscle and core temperature without causing fatigue or reduced energy stores (it should make you sweat and you should be slightly breathless).

A warm up also prepares the body physically and mentally for your training session. At the start of exercise, the body begins to release adrenalin, which increases the heart rate and causes dilation of the capillaries in the muscles.

This has the dual function of increasing the temperature and elasticity of the muscles to help prevent injury and improve the speed at which oxygen can be transported around the body. The increased temperature allows the enzymes required for the muscular contraction to function more efficiently.

Warm up also make you more alert as the increased body temperature allows nerve impulses to travel more quickly, improving reaction time. There are also psychological benefits of a warm up, especially if you are superstitious and perform the same routine every time you exercise or compete.

The warm up you do may need to vary depending on the environmental conditions (hot or cold/dry or humid) and should be completed 5-10 minutes before undertaking your Wattbike session.

Recommended Warm Ups

The recommended warm up for the different type of session is:

- **Recovery** - Warm up 5' slow pedalling – repeat for cool down
- **Zone 1 & Zone 2** - Warm up 5'-10' at Recovery Zone, repeat for cool down
- **Zone 3** - Warm up 10' progressive Recovery-Zone 1-Zone 2, cool down 10' at Recovery Zone
- **10' Progress Check** - Warm up 5' at 50% of MMP, cool down 5-10 minutes at Recovery Zone
- **Technique, Zone 4, Zone 5 and 3' & 20' Tests** - These sessions have a specific warm up which is based on Maximum Minute Power (MMP), see below



The 20 min Warm up for Technique, Zone 4, Zone 5 and 3' & 20' Tests

The Technique, Zone 4 and Zone 5 sessions and the 3' & 20' Tests have their own warm up due to their nature as high intensity sessions.

The idea is to make sure you are adequately warmed up for a high intensity training session, without causing fatigue. The warm up routines are examples only – getting the warm up right so that it really works for an individual cyclist may take time. It is important to use and practice the warm up so the body adapts to the routine – it could be used as a stand alone practice session.

The resistance level and cadence you use for this warm up routine depends on your maximum minute power result and your cadence preference.

The exact position of the 'rev outs' can be variable but make sure they are towards the end of the warm up and that you have 1' steady pedalling between each 'rev out'. Always complete the warm up with 2'-3' minutes at the lowest recommended cadence level. The last interval of 2'42" is to make the warm up last exactly 20 minutes.

Warm up on the Wattbike Pro

Warm Up A - Cadence 90-110rpm

Levels:

- for people with MMP of < 320 W - use Air Damper Lever Setting 1
- for people with MMP of 320-360 W - use Air Damper Lever Setting 2
- for people with MMP of 360-440 W - use Air Damper Lever Setting 3
- for people with MMP of >440 W - use Air Damper Lever Setting 4

Time	5'	2'	2'	2'	1'30"	30"	2'	6"	1'	6"	1'	6"	2'42"
Cadence	90	95	100	105	110	Rev out 120-130	90	Max rev out 150+	90	Max rev out 150+	90	Max rev out 150+	90

If your MMP is less than 280-320 you may wish to consider the Wattbike Trainer as the Wattbike of choice. Warm up B and C are shown only as possible alternatives for cyclists with lower leg speed OR MMP.

Warm Up B - Cadence 85-105rpm

Levels:

- for people with MMP of < 290 W - use Air Damper Lever Setting 1
- for people with MMP of 290-320 W - use Air Damper Lever Setting 2
- for people with MMP of 320-390 W - use Air Damper Lever Setting 3
- for people with MMP of > 390 W – also use Air Damper Lever Setting 3



Time	5'	2'	2'	2'	1'30"	30"	2'	6"	1'	6"	1'	6"	2'42"
Cadence	85	90	95	100	105	Rev out 115-125	85	Max rev out 150+	85	Max rev out 150+	85	Max rev out 150+	85

Cadence 80-100rpm

Levels:

- for people with MMP of <260 W - use Air Damper Lever Setting 1
- for people with MMP of 260-290 W - use Air Damper Lever Setting 2
- for people with MMP of 290-350 W - use Air Damper Lever Setting 3
- for people with MMP of > 350 W – also use Air Damper Lever Setting 3

Time	5'	2'	2'	2'	1'30"	30"	2'	6"	1'	6"	1'	6"	2'42"
Cadence	80	85	90	95	100	Rev out 110-120	80	Max rev out	80	Max rev out	80	Max rev out	80

Warm up on the Wattbike Trainer

Warm Up - Cadence 90-110rpm

Levels:

- for people with MMP of < 185 W - use Air Damper Lever Setting 1
- for people with MMP of 185-200 W - use Air Damper Lever Setting 2
- for people with MMP of 200-250 W - use Air Damper Lever Setting 3
- for people with MMP of 250-300 W - use Air Damper Lever Setting 4
- for people with MMP of 300-350 W - use Air Damper Lever Setting 5
- for people with MMP of 350-390 W - use Air Damper Lever Setting 6
- for people with MMP of 390-425 W - use Air Damper Lever Setting 7
- for people with MMP of 425-450 W - use Air Damper Lever Setting 8
- for people with MMP of 450-485 W - use Air Damper Lever Setting 9
- for people with MMP of >485 W – Use air damper Lever setting 10

Time	5'	2'	2'	2'	1'30"	30"	2'	6"	1'	6"	1'	6"	2'42"
Cadence	90	95	100	105	110	Rev out 120-130	90	Max rev out 150+	90	Max rev out 150+	90	Max rev out 150+	90

If your MMP is greater than 300-320 you may wish to consider the Wattbike Pro as the Wattbike of choice.

Always err on the side of caution and choose a level that produces the warm up effect.



Recommended Cool Downs

The recommended cool downs for the different type of session:

- **Recovery** - 5' slow pedalling
- **Zone 1 & Zone 2** - 5'-10' at Recovery Zone
- **Zone 3** - 10' at Recovery Zone
- **10' Progress Check** - 5-10 minutes at Recovery Zone
- **Technique, Zone 4, Zone 5 and 3' & 20' Tests** - 15-20 minutes at Recovery Zone

Do not miss your warm up and cool down, they are important components of any training session.



Rest and Recovery

You can only train as hard as you can rest.

Rest is good. If you feel tired you probably are tired.

Recovery between sessions is not all about the duration, intensity and physiological effort of your cycling sessions.

Recovery is influenced by many other factors. Simple influences may be diet, hydration and sleep. More complex issues concern work and family stress. You need to be aware of the influence of your individual lifestyle on your recovery. If it is clear that you not over training then look at lifestyle issues for the cause of any deterioration. If you are in a period of heavy work or family stress reduce the number of training sessions and, both the duration and intensity of the sessions.

A maximum of 3 sessions per week with a full 24 hours between each one is recommended. Sessions in your Recovery and Zone 1/Zone 2 should be sufficient to maintain fitness in the short term and help manage recovery and reduce stress.

Illness

Training whilst ill is not recommended. Sometimes deterioration in performance is a precursor to illness - STOP TRAINING – You will recover quicker with rest.

When you restart ease back into training with some training sessions in your Recovery to Zone 1 and Zone 2 heart rate and power training Zones.

The Recovery, Zone 1 and Zone 2 Rule

In periods of illness, injury or stress never exceed training Zones Recovery/Zone 1/Zone 2 for any session. Limit the session to less than 45'. This is a short term rule only. 3 sessions per week at low intensity/short duration is insufficient to maintain a high trained status so if recovery is prolonged a reassessment of your training Zones may be needed.

Under recovery

Under recovery is the main reason why cyclists under perform or deteriorate. The traditional view has been 'if it's not 'hard' it hasn't done any good'. Continual 'hard' training leads to under recovery, illness, injury, over training and under performance. A good training program balances duration, intensity and recovery to maximize physiological adaptation and race performance.

Heat/Cold/Humidity

Don't misinterpret sessions in extreme environmental conditions. Heat and/or high humidity in particular will have a marked influence on your performance and recovery. Heart rate will be elevated significantly and power or distance will be reduced. Do not take this as an indication of deterioration – adapt your cycling session to the conditions.

Neuromuscular and DOMS (Delayed Onset Muscle Soreness)

It should be noted that heart rate is measuring the cardiovascular effects of training – it does not measure neuromuscular fatigue or muscle soreness and stiffness.

Whilst training sessions in Training Zones 4-6 will promote race specific neuromuscular adaptations heart rate is not a direct measure of the neuromuscular fatigue. When considering your recovery needs and planning the balance of your training program these additional recovery issues need to be included.

Neuromuscular fatigue can be defined as 'fatigue representing the decline in muscle tension capacity with repeated stimulation'. Commonly this manifests itself in an inability to achieve a sub maximal or maximal exercise or training response. The exact causes of neuromuscular fatigue are unclear.

Muscle and stiffness can persist for several hours whereas muscle soreness (DOMS – delayed-onset muscle soreness) can appear later and last for a number of days. There are a number of direct causes of DOMS such as minute tears in muscle tissue and overstretching.

Neuromuscular fatigue and muscle soreness and stiffness extend the recovery period required before the body is ready for the next training session.

The benefits of measuring recovery

How to measure recovery is beyond the scope of this Training Guide – however there are many benefits to measuring recovery:

- Detect early signs of overtraining or illness
- Optimize training load by finding the balance between training load and recovery
- Evidence based support for critical coaching decisions
- Record individual reference values e.g. during off-season when the body is recovered
- Check the recovery status during hard training periods
- Check recovery status when subjective feelings and fitness level indicates poor recovery
- Make sure that the body is recovered sufficiently before a new hard training period



The link between Training Zones and Recovery

It is important to recognize that a Training Zone is also an indication of the Rest and Recovery period needed before the next training session (and therefore fatigue is linked to the duration and intensity of a training session)

- Well timed rest is one of the most important factors of your training
- The effectiveness of a training session can be negligible or even detrimental if you do not include sufficient rest and recovery and periodization into your training program
- Your body needs time for recovery after a single high intensity session or a hard training period of several days or even after a low intensity but long cycling session
- Without rest your body's adaptation to the training stimulus will not occur. In the worst case training will lead to exhaustion and a state of overstress otherwise known as overtraining or under recovery.

A Training Zone identifies the general exertion level of your training.

During training, fatigue is temporarily increasing with recovery starting immediately after the session is completed. With recovery performance rises above the pre-training level because the body is preparing to handle the next training stimulus better than before.

If your body does not receive the next training stimulus within a reasonable period of time the achieved physiological adaptation begins to slowly decrease (detraining). However, if the next high intensity session is held BEFORE your body has recovered from the previous one the physiological adaptation will remain lower than it would have been after full recovery.

Continuous hard training with insufficient recovery will slowly lead to lower performance and a long term state of overtraining. When over trained even a long period of recovery may not be enough to return performance to the original level.

Longer more sustainable cycling may leave you less exhausted but will cause more total fatigue resulting in a longer recovery period.

Some of your cycling sessions will be interval training rather than continuous cycling where periods of high heart rates are followed by recovery periods. If the intervals are long and the recovery periods are short fatigue may reach a sufficiently high level to give you a significant recovery period.

However, for short intervals even with short recovery periods your fatigue may not accumulate sufficiently to calculate a realistic recovery period. Heart rate may rise to high levels but differs from cyclist to cyclist. Care is needed in assessing the recovery period needed.

The Training Zones correlate strongly with the lactate level of your body although for long-endurance training the correlation is not as strong (and recovery may take longer than anticipated). As a general rule a high Training Zone (5-6) can only be reached in training that



also causes high lactate. Base endurance training with low lactate also has low Training Zone (Recovery through to Zone 1-Zone 4).

Training Zones	Blood lactate levels
Recovery	less than 1.0 mmol
Zone 1	1.0-1.5 mmol
Zone 2	1.5-2.0 mmol
Zone 3	2.0-2.5 mmol
Zone 4	2.5-3.5 mmol
Zone 5	3.5-6.0 mmol
Zone 6	more than 6 mmol
Supra-maximal	more than 6 mmol

NOTE

Recovery is not just a question of the lactate level. Of more importance are the cardiovascular fatigue (linked to duration and heart rate), muscular fatigue and fatigue caused by lifestyle issues. It cannot always be assumed that a training session that causes low lactate is also one with a short recovery period.

Training Zones also be considered in the context of Recovery Time

Scale of Recovery Time (Depends on the time spent at each level):

Training Zone	Recovery time in hours/days
Recovery and Zone 1	a few hours
2	3 hours to 1 day
3	1 to 2 days
4	1 to 4 days
5	2 to 7 days
6	7 days +

General Guidelines

The best way to train is on a Wattbike is by cycling at even heart rate over a set time or distance tracking progress for improvement or deterioration in watts, speed or time to complete a set distance. It is important not to misinterpret the data – you must expect day to day variation in power output, distance covered and heart rate. What you are looking for is a trend – a period of improvement or deterioration.

Small fluctuations are normal. For some sessions – AND THIS IS IMPORTANT power or distance



covered is unimportant. If cycling for recovery it is the recovery element that is paramount, stay in your recovery heart rate Zone.

Effective Training

A common mistake is to always train at high intensity and long duration. This tends to develop 'one pace cycling' usually characterized by a gradual decline in performance over time. Such cyclists tend to have a high propensity to illness and over training (usually undiagnosed). By reducing the duration and intensity of training and allowing sufficient recovery there may be significant short term improvement even for older athletes simply because training is more effective. In general 'more is less' and 'less is more'.

If you find that you are training mostly in Zones 4 and 5 you are most certainly over training and under recovering. The majority of your training should be in Zones 1-3 with fewer sessions in Zones 4 and above.

If I don't see improvement why use Training Zones to monitor my training?

It depends on your definition of improvement. When you first start using Training Zones you may see significant improvement in the power or distance completed for the same physiological effort.

After a while the power, distance and heart rate will plateau into consistency i.e. minimal variation in any of the parameters. This is because there are invisible improvements (physiological adaptation) happening. These improvements may take months or even years to develop. Building base endurance is the key to cycling faster at the higher intensities.

By using Training Zones to monitor your training you can manage your expectations, track each session for the correct level of duration-intensity-recovery, prevent illness and over training and make your cycling all the more enjoyable.

How do I know if I am improving or declining?

You may recover from a cycling session rapidly (short term fatigue) but carry accumulated (long term) fatigue from cycling session to cycling session. This long term fatigue builds up over time and is one reason why you need a periodized training program that has built in recovery sessions.

There are a number of key signs that indicate improvement or deterioration:

Improvement

- Increasing power or distance covered for the same physiological effort
- Reducing physiological effort for the same power or distance

Deterioration

- Reducing power or distance for the same physiological effort
- Increasing physiological effort for the same power or distance

Should I improve all the time?

The simple answer is NO. There are limits and it is important to know your limits to get the most out of your training and to prevent over training. There are three questions to consider:

- Have you reached your physiological limits?
- Are you fighting age decline?
- Is your training ineffective?

Physiological Limits

Not everyone can be a top athlete, so much depends on genetics. It is true that you can improve aspects of body composition, strength, endurance and maximal oxygen uptake but only so far.

However it may still be possible to get a significant improvement with the correct level of duration-intensity-recovery training. For instance untrained individuals may be able to improve their VO₂max by as much as 25% with training whereas in experienced cyclists improvement may only be 2-3%.

Manage your expectations to get the best out of your training and the use of training Zones to monitor training sessions.

Age decline

The science of aging predicts a gradual decline in the body's ability to function as we get older. The precise mechanisms underlying the aging process are not fully understood, but the rate of decline in the general population of biological and physiological functions is known to be progressive and age related.

The reduction in exercise capacity in older individuals stems from a decrease in muscle mass, cardiovascular function and respiratory function. One age-related alteration to respiratory function is decreased respiratory muscle strength and endurance and decline in respiratory muscle strength may lead to breathlessness during activities of daily living and exercise.

The following panel summarizes the general and specific age related evidence for biological and physiological decline.

General evidence

- Biological and physical peak is reached between ages 20-35



- During middle age 35-45 physical activity usually declines with a 5-10kg accumulation of body fat
- In later middle age (45-65) women reach menopause and men reduce substantially their output of sex hormones. The decline in physical condition continues and may accelerate
- In early old age (65-75) there may be a modest increase in physical activity following retirement but by middle old age (75-85) many people have developed some physical disability and in very old age, (over 85) total dependency may set in
- Typical expectation is 8-10 years of partial disability and a year of total dependency

Physiological evidence

- Maximum heart rate declines with age
- Maximal oxygen uptake (VO₂max) decreases by 10% per decade in men and women regardless of age and exercise activity although some studies have shown no decline in aerobic capacity during a 10 year period in people maintaining constant training
- Factors other than physical activity are also crucial to the decline of maximal oxygen uptake hereditary issues, increase in fat, decrease in skeletal muscle mass

However, it's not all bad news; several studies have shown that, for athletes the decrease in maximum heart rate from age 50-70 is smaller than non-athletes.

Additionally exercise training for older people may increase aerobic capacity to the same relative extent (15-30%) as in younger adults.

Indeed, the endurance performance of older athletes provides good evidence of the benefits of maintaining regular exercise to preserve cardiovascular function.

The overall conclusion is that exercise training improves physiologic response at any age and improvements often occur at a rate and magnitude independent of a person's age.

A key point for older cyclists is to remember that the older body needs more recovery time than the younger body.

Summary

- Set realistic goals within the framework of your own physiology and performance
- Be aware of aging and adjust expectations and the volume of training accordingly - remember an older body needs more recovery time than a younger one
- Develop an effective training program, one that balances duration-intensity-recovery

Fluid And Carbohydrate Intake Before, During And After Training

When training on an indoor cycle careful attention to fluid and carbohydrate intake is required. Try to train in an air conditioned area or an area with good natural air circulation. A fan may help – keeping cool is important.

Fluid intake during training

Almost any dehydration impairs performance - For each litre of sweat lost to dehydration, your heart rate will increase by approximately 8 beats and this will significantly reduce performance if the body is not continually re-hydrated.

The loss of water represents the most serious consequence of profuse sweating. Intensity and duration of exercise, external temperature and humidity determine the amount of water lost through sweating. Water loss (dehydration) can seriously impair your training, and subsequent recovery so careful attention to drinking strategy is important.

Fluid loss from the vascular compartment places a significant strain on circulatory function which ultimately impairs training performance and thermoregulation of the body.

Therefore taking on fluid before and during training will reduce the detrimental effects of dehydration on performance. Adding carbohydrates to your fluids will provide additional glucose energy. Determining the optimal fluid/carbohydrate mixture and volume becomes important to minimise fatigue and dehydration.

The body needs liquid intake on sedentary days of approximately 2.5 litres of water which it draws from food (0.8 L), stores (0.5 L) and direct liquid intake (1.2 L). On active days you may need much more 2-4 litres so remember to remain well hydrated.

Keeping a check on your body weight is a useful indicator of fluid loss every 0.45 kg of body weight lost is equivalent to 0.45 L of dehydration.

It is important to continually replace liquid throughout the normal day and during training – when training try to get into a regular habit of drinking every 10-15 minutes.

Consuming 0.4-0.6 L of fluid immediately before training and drinking .0.15-0.25 L every 15 minutes during training will optimise the beneficial effects of fluid intake. Fluid delivery of about 1L per hour should meet the needs of your training.

Carbohydrate intake required during and after training

One hour of cycling will reduce liver glycogen by over 50% - 2 hours of cycling will deplete all of the glycogen content of the liver and active muscles.

Before each training session a small amount of low (apples/butter-navy-kidney beans/



lentils) to moderate (white pasta/oatmeal/All-bran/peas) glycemic food should be eaten to provide energy at the right time.

Consuming 60g of liquid or solid carbohydrates each hour during your training sessions will help to postpone fatigue.

If you are doing an ultra long session on the Wattbike a single concentrated carbohydrate feed about 30 minutes before anticipated fatigue (generally about 2 hours into a session) is as effective as periodic carbohydrate feeding.

Immediately after training replenish your body with a small amount of high (oranges/white rice/corn flakes/new potatoes) glycemic food and within 2 hours a moderate glycemic food meal should be eaten.

Cycling Tests

The primary purpose of a Wattbike test is to set your heart rate and power training Zones, monitor changes in fitness and provide information about the effectiveness of your training workouts using scientific, comparable and reliable measures.

In addition the consistent and reliable data output from a Wattbike test is available to track direct changes in your performance over specific distances and durations.

Ideally, tests should only be carried out by qualified personal trainers, coaches, sports scientists (physiologists) and trained medical personnel. However it is recognized that as a Wattbike user you may wish to carry out a basic test to help you understand your current fitness level and to use in conjunction with your own training plan or the Wattbike training plans.

This section is not an exhaustive manual of cycling tests but the tests selected cover the requirements of this Guide. You may wish to use other cycling tests not in this Guide or design your own appropriate test (s). Contact Wattbike if any guidance is required.

Initial testing provides the data and information required to start a Wattbike training plan. Ongoing regular testing will give you a picture of short, medium and long term changes in all aspects of your cycling performance or general fitness.

Tests should be carried out at the beginning of each phase of your training plan and at specific points during a training phase to monitor changes in your performance.



For more information about SiS products please visit
www.scienceinsport.com



Whilst the tests can be carried out using just the Wattbike and a heart rate monitor, gas analysis and lactate testing can be integrated into the test protocols.

Before any test is undertaken you should warm up correctly. Following completion of a test you should cool down correctly.

Each test has a recommended warm up and cool down and each test protocol clearly states the applicability of the test to individual Wattbike users.

The tests

Whilst there are many different cycling tests we have selected 4 different tests that cover the requirements of this Guide.

- 3 minute aerobic test
- 10 minute progress check (based on 3 minutes)
- Ramp test
- 20 minute high percentage of maximum minute power test

3 minute aerobic test

This test estimates aerobic capacity. The absolute average power and maximum heart rate achieved during the test can be used as an estimate of maximum minute power and maximum heart rate to calculate heart rate and power training Zones

Aerobic capacity is related to the ability to perform moderate to high intensity exercise for prolonged periods and is an important component for endurance cyclists and for general fitness.

10 minute progress check (based on 3 minutes)

Using a maximal test to measure aerobic capacity is extremely fatiguing and should be used sparingly. This test is a progress check test of aerobic capacity using the result of the 3 minute aerobic test to set the sub maximal level. It has the advantage of being less fatiguing than a maximal test and has a short recovery period.

A regular check is useful to track training progress.

Ramp tests

A ramp test also measures aerobic capacity. The average power achieved in the final minute is known as maximum minute power and together with the maximum heart rate achieved during the test can be used to calculate heart rate and power training Zones. A ramp test is designed to last for 8-12 minutes so selection of the correct starting power is important.

Aerobic capacity and maximum minute power are important components for serious endurance cyclists and for general fitness.

20 minute high percentage of maximum minute power test

This is a test for experienced cyclists only (used only for Training Plans 4 & 5 and the Triathlon Plan of this Guide). It is usually conducted at 75-80% of maximum minute power (Z5 heart rate and power training Zone) and measures improvement in sustaining a high percentage of maximal aerobic power.

This is a progress check test so cyclists should have first conducted the 3 minute aerobic test to establish maximum minute power and maximum heart rate to establish heart rate and power training Zones.

For a more detailed analysis consider live recording your tests in Wattbike Expert Software or transferring the data to the software for later analysis.

All your test results can be stored in the Wattbike Expert database for future comparison www.wattbike.com/uk/wattbike/expert_software

Warning

The tests in this Guide assume a high level of basic fitness and should not be attempted if you are a beginner or have been recently ill or injured (use the estimated methods). If in doubt consult your Doctor before you commence a Wattbike test or training plan.

The tests are not suitable for children or young adults under the age of 18 unless under supervision.



3 Minute Aerobic Test

This test estimates aerobic capacity. The absolute average power and maximum heart rate achieved during the test can be used as an estimate of maximum minute power and maximum heart rate to calculate heart rate and power training Zones.

Aerobic capacity is related to the ability to perform moderate to high intensity exercise for prolonged periods and is an important component for endurance cyclists and for general fitness.

Conducting the 3 Minute Aerobic Test

Warm up for 10-20 minutes at low intensity to moderate intensity with a cadence of 70 to 90 rpm. Include 3 x 6 second high cadence sprints in your warm up.

1. From the Main menu select Workout (down button), press ENTER. Select New workout (down button) and set up a New workout for a time of 3 minutes.
2. A heart rate monitor (Polar [uncoded] with heart rate receiver, or a coded ANT or ANT+SPORT heart rate chest belt – Suunto or Garmin) is required.
3. From the Main menu go to Setup select HR and press ENTER this goes to the HR setup screen, select ANT chest belt or Polar un-coded chest belt (not forgetting to connect the HR Interface cable for Polar) and follow the instructions on the display.
4. When connected press ESC until the display returns to the Main menu. The HR belt is now connected.
5. Press ESC until the display returns to the Main menu.
6. From Custom workout (Main menu - Workout - Custom) select the 3 minute workout. Select the Watts display screen (consider using these Watts with the Polar Graph display to look at left/right leg symmetry and pedalling technique during the test).
7. Set the air resistance lever to the required level.
8. From a static starting position pedal, in a seated position at a cadence (r/m) that can be maintained for 3 minutes (recommended 90-110 r/m).
9. Record
 - Power average (W) - this is the estimate of your maximum minute power (use Recall to get this information - also note the average cadence)
 - The maximum heart rate that you achieved (you will need to watch for this visually during the test or record separately) - this is the estimate of your maximum heart rate



- Use your maximum heart rate and maximum minute power with the table on the Heart Rate and Power Training Zones page.



Air Resistance Setting and Cadence Recommendations - 3 Minute Aerobic Test

The Wattbike is an air resistance bike so factors such as training background, age, gender, height and weight all influence the optimal air resistance setting. For this test the Magnetic Climb Lever should ALWAYS be set at 1.

A little experimentation will quickly establish the correct setting and cadence combination. Cadence should normally be in the range 90-110 revolutions per minute (rpm) for this test. Lower than 90 rpm may be relevant for inexperienced cyclists and higher than 110 rpm for experienced cyclists although very low cadences may indicate too high an air resistance setting and very high cadences too low an air resistance setting.

We suggest you settle on 100 rpm as a benchmark.

Within the calibration range of each Wattbike and, for every air resistance setting of the Wattbike and cadence combination the Watts output is known. This makes it relatively simple to set the resistance and cadence to achieve a required output. Training and testing on a Wattbike is therefore reliable, accurate and comparable.

The tables below approximate the power output in Watts for selected combinations of cadence and air resistance settings for both the Wattbike Pro and the Wattbike Trainer, clearly demonstrating the importance of leg speed.

Whilst the tables show all the air resistance settings from 1 to 10 it is anticipated that for most people the most effective setting will be in resistance range 1-5 on the Wattbike Pro (in exceptional circumstances powerful cyclists may need a higher resistance setting) with the full range of air resistance settings available on the Wattbike Trainer.

At 100 cadence the minimum power output on the Wattbike Pro is 195 W at resistance level 1 up to 520 W at resistance level 10. On the Wattbike Trainer the range at 100 cadence is 110 W at resistance level 1 through to 300 W at resistance level 10.

As a general rule if your 3' test score is more than 280-320 W you can train on either the Wattbike Pro or Wattbike Trainer although for higher scores the Wattbike Pro is more appropriate. If your score is under 300 W then it is recommended that you train on the Wattbike Trainer although note there is some overlap between the Wattbike models.

Resistance levels 5-10 on the Wattbike Trainer overlap resistance levels 1-3/4 on the Wattbike Pro.

Power output in Watts at different cadence and air resistance setting. For ease of reference the Watts rounded to the nearest 5 W.



Wattbike PRO Air resistance Cadence/Power [W] Table

rpm/resistance	1	2	3	4	5	6	7	8	9	10
80	115	125	150	170	195	215	235	250	270	280
85	130	145	170	195	225	260	275	295	320	340
90	150	165	200	235	265	300	325	350	375	390
95	175	185	225	265	310	350	375	400	425	450
100	195	215	260	310	355	395	430	465	500	520
105	210	230	295	350	400	445	490	525	565	600
110	245	270	330	395	455	510	555	600	645	675
115	270	310	380	445	515	575	625	675	725	760
120	300	335	410	490	570	640	695	750	810	850

Wattbike TRAINER Air resistance Cadence/Power [W] Table

rpm/resistance	1	2	3	4	5	6	7	8	9	10
80	65	70	85	95	110	125	135	145	155	160
85	75	80	100	115	130	145	160	170	180	190
90	85	95	115	135	150	170	185	200	215	225
95	100	110	130	155	175	200	215	230	245	260
100	110	125	150	175	200	225	245	265	285	300
105	125	140	170	200	230	260	280	300	325	340
110	140	155	190	225	260	290	320	340	365	385
115	155	175	210	250	290	325	355	385	415	435
120	170	190	235	280	325	365	395	430	460	485

Careful selection of the air resistance setting and cadence range is important as the best result is achieved by maintaining constant cadence and power (Watts) output throughout the whole 3 minutes of the test.

Example:

You set the air resistance lever at setting 3 on the Wattbike Pro and ride at 100 cadence for 3 minutes.

This means you will produce an average power in Watts of 260 W equivalent to a speed of 40.8 kmh and a distance of 2,040m in 3 minutes.

For purposes of the example assume your maximum heart rate during the 3 minutes is 188. Your maximum minute power is 260 Watts and maximum heart rate is 188 bpm for the purpose of calculating heart rate and power training Zones.

If you weigh 75 Kg then your power to weight ratio is 3.47 W/Kg i.e. 260/75.



Applying this information to the British Cycling power and heart rate training Zone chart gives training Zones for this example of:

Training Zone	Purpose	% MHR	HR (bpm)	%MMP	Power (Watts)
Recovery	Regeneration and Recovery	<60	<133	<35	<91
1. Basic	Establish base endurance	60-65	113-122	35-45	91-117
2. Basic	Improve efficiency	65-75	122-141	45-55	117-143
3. Intensive	Improve sustainable power	75-85	141-154	55-65	143-169
4. Intensive	Push threshold up	82-89	154-167	65-75	169-195
5. Maximal	Sustain a high percentage of maximal aerobic power	89-94	167-177	75-85	195-221
6. Maximal	Increase maximum power output	94+	>177	85-100	221-260
Supra-maximal	Increase sprint power output	N/A	N/A	>100	>260



10 Minute Progress Check

This test is a progress check of aerobic capacity using the result of your 3 minute aerobic test to set the sub maximal level. It has the advantage of being less fatiguing than a maximal test and has a short recovery period.

Regular progress checks are useful in tracking the effectiveness of your training plan. The training plans recommend "progress checkpoints". Improvement is indicated by a progressively reducing heart rate for the same cadence/power output.

Conducting the Wattbike 10 Minute Progress Check

1. This is a sub maximal progress check based on the average power achieved during your 3 minute aerobic test.
2. A heart rate monitor (Polar [uncoded] with heart rate receiver, or a coded ANT or ANT+SPORT heart rate chest belt, Suunto or Garmin) is required.
3. In Setup select HR and press ENTER this goes to the HR setup screen, select ANT chest belt or Polar un-coded chest belt (not forgetting to connect the HR Interface cable for Polar) and follow the instructions on the display.
4. When connected press ESC until the display returns to the Main menu - The HR belt is now connected.
5. In the Main menu select Recall and the Set split. Set the split intervals for 1 minute.
6. Press ESC until the display returns to the Main menu.
7. Warm up for 5 minutes at 50% of the average power achieved in your 3 minute aerobic test.
8. From the Main menu select Workout (down button), press ENTER. Select New workout (down button) and set up a New workout for a time of 10 minutes.
9. From Custom workout (Main menu - Workout - Custom) select the 10 minute workout. Select the Watts display screen (consider using these Watts with the Polar Graph display to look at left/right leg symmetry and pedalling technique during the test).
10. Set the air resistance lever to the setting used during your 3 minute aerobic test.
11. From a static starting position pedal at an even cadence keeping the power at 70% of the power achieved in your 3 minute test.
12. Record the average HR at the end of each 1 minute (use the Recall Summary split information to get this information, once the test has been completed) for comparison against future progress checks.



The table below may be of help when calculating 50% and 70% of 3 minute power.

3 min (W)	100	125	150	175	200	225	250	275	300	325
50%	50	62.5	75	87.5	100	112.5	125	137.5	150	162.5
70%	70	87.5	105	122.5	140	157.5	175	192.5	210	227.5

3 min (W)	350	375	400	425	450	475	500
50%	175	187.5	200	212.5	225	237.5	250
70%	245	262.5	280	297.5	315	332.5	350

Example

You set the air resistance lever at setting 3 on the Wattbike Pro and ride at 100 cadence for 3 minutes. Your maximum minute power is 260 Watts.

10 minute progress check:

- Warm up 50% of 260 W = 130 W on air resistance setting 3 = approximately 75 cadence (rpm)
- Test at 70% of 260 W = 182 W (say 180 W) on air resistance 3 = 87 cadence (rpm)

Use the resistance setting, cadence and power table to get your individual values. (see page 9)

Ramp Tests

There are a number of ramp tests used in the cycling world. We have adopted two different protocols:

Storer test for non cyclists

British Cycling ramp test for experienced cyclists

The Storer Test

This test is adapted from Storer et al. (1990 Storer TW, Davis JA, & Caiozzo VJ. Accurate prediction of VO₂max in cycle ergometry. Med Sci Sports Exerc 1990; 22:704-712.) and is a progressively increasing cycling test (power increases every minute).

The formula associated with this test has the added advantage of estimating maximum oxygen uptake (VO₂max) using body weight (Kgs), age and maximum minute power to determine the result. Compared to direct measures it gives a good estimate [$\pm 6\%$].

This test measures aerobic capacity. The average power achieved in the final minute (maximum minute power) and the maximum heart rate achieved during the test can be used to estimate heart rate and power training Zones.

Warning

To estimate whether you should do the Storer ramp test do the 3 minute test first - for male cyclists if you achieve a 3 minute average power of 280 W or less then the Storer test is suitable for you. Females have the option of using the Storer test or the British Cycling ramp test (providing the 3 minute test result is more than 215 W).

The Storer ramp test starts at 100 W and ramps by 15 W every minute. The test should last 8-12 minutes - an 8 stage test would take the power to 205 W in the 8th minute and a 12 stage test would take the power to 265 W in the twelfth minute.

12 stage Storer ramp test

Stage	1	2	3	4	5	6	7	8	9	10	11	12
Watts	100	115	130	145	160	175	190	205	220	235	250	265

1. Warm up for 5 minutes at low intensity to moderate intensity with a cadence of 70 to 90 rpm.
2. A heart rate monitor (Polar [uncoded] with heart rate receiver, or a coded ANT or ANT+SPORT heart rate chest belt - Suunto or Garmin) is required.
3. From the Main menu go to Setup select HR and press ENTER this goes to the



HR setup screen, select ANT chest belt or Polar un-coded chest belt (not forgetting to connect the HR Interface cable for Polar) and follow the instructions on the display.

4. When connected press ESC until the display returns to the Main menu. The HR belt is now connected.
5. Press ESC until the display returns to the Main menu.
6. In the Main menu select Recall and the Set split. Set the split intervals for 1 minute.
7. Press ESC until the display returns to the Main menu.
8. From the Main menu select Just ride. Select the Watts display screen.
9. Use the table below to work out the air resistance settings and cadence to use for this test.
10. You may need someone to assist you and keep you on track.
11. Pedal in a seated position for 1 minute at the starting power.
12. Increase the air resistance setting and cadence as necessary every minute to ensure an approximate 15W increase in power (W) output very minute.
13. Keep increasing the power (W) output by 15W every minute until you cannot complete a full minute at the ramp level (only complete minutes count).
14. Record:
 - Highest Power average (W) achieved in the final complete minute - this is the estimate of your maximum minute power (use Recall to get this information)
 - Note the maximum heart rate that you achieved (you will need to watch for this visually during the test) - this is the estimate of your maximum heart rate

Record the data for each complete minute for comparison against future retests - use the Recall Summary to get this information:

- Power average
- Average cadence
- Average HR

Apply your maximum minute power and maximum heart rate to the table on the Heart Rate and Power Training Zones (p19).



Air Resistance Setting And Cadence Recommendations - Storer Test on a Wattbike Pro

Resistance levels 1 to 4 should be used for this test depending on your cadence preference. We recommend that you use a maximum cadence of 100 for this test i.e. air resistance levels 3 and 4 if able to perform 12 x 1 minute stages.

You can check whether you are on track by observing the average watts on the Wattbike Performance Computer as the test progresses:

Resistance			1	2	3	4
Stage	Watts	Watts cum. avr	Cadence			
1	100	100	76	72	68	65
2	115	107.5	80	77	72	68
3	130	115	85	81	75	71
4	145	122.5	88	86	81	74
5	160	130	92	89	84	79
6	175	137.5	95	92	86	82
7	190	145	101	96	89	84
8	205	152.5	104	99	92	86
9	220	160	106	101	94	89
10	235	167.5	109	104	96	91
11	250	175	112	106	99	93
12	265	182.5	114	109	101	95

It's far easier to conduct this test by selecting a cadence progression that allows you to leave the resistance setting at the same level throughout the test or a cadence that needs the minimum number of resistance settings.

For example: 8 stages from 100 W to 205 W can be achieved by increasing the cadence for 72 at 100 W to 99 cadence at 205 W leaving the resistance setting at level 2 throughout the whole of the test.

12 stages from 100 W to 265 W can be achieved using resistance setting 3 (cadence 68 to 101) or resistance setting 4 (cadence 65 to 95).

Choose the cadence range and resistance setting that reflects your cadence style.



Air Resistance Setting And Cadence Recommendations - Storer Test on a Wattbike Trainer

Resistance levels 6 to 10 should be used for this test depending on your cadence preference.

We recommend that you use a maximum cadence of 100 for this test i.e. air resistance levels 8 to 10 if able to perform 12 x 1 minute stages.

You can check whether you are on track by observing the average watts on the Wattbike Performance Computer as the test progresses:

Stage	Resistance		6	7	8	9	10
	Watts	Watts cum. avr	Cadence	Cadence	Cadence	Cadence	Cadence
1	100	100	74	72	70	69	68
2	115	107.5	78	75	74	72	71
3	130	115	82	79	77	75	74
4	145	122.5	85	82	80	78	77
5	160	130	88	85	83	81	80
6	175	137.5	91	88	86	84	82
7	190	145	94	91	88	86	85
8	205	152.5	95	93	91	89	87
9	220	160	99	96	93	91	90
10	235	167.5	102	98	96	93	92
11	250	175	104	101	98	95	94
12	265	182.5	106	103	100	97	96

It's far easier to conduct this test by selecting a cadence progression that allows you to leave the resistance setting at the same level throughout the test or a cadence that needs the minimum number of resistance settings.

For example: 8 stages from 100 W to 205 W can be achieved by increasing the cadence for 74 at 100 W to 97 cadence at 205 W leaving the resistance setting at level 6 throughout the whole of the test.

12 stages from 100 W to 265 W can be achieved using resistance setting 8 (cadence 70 to 100), resistance setting 9 (cadence 69 to 97) and resistance setting 10 (68 to 96).

Chose the cadence range and resistance setting that reflects your cadence style.



British Cycling Ramp Test

The starting power for this test depends on your gender and average power over 3 minutes. To get the best combination of resistance and cadence levels, all British Cycling ramp tests should be conducted on the Wattbike Pro. For females consider the alternative Storer test using the Wattbike Trainer. It's maximum minute power is expected to be less than 265W.

To estimate your starting power for the ramp test do the 3 minute test first – round the average power to the nearest multiple of 20 Watts (male) or 15 Watts (female) and apply to the tables below. Count back 10 stages – this is the starting power for your test.

You should select a starting power that ensures the test lasts 8-12 minutes only.

Male ramp test starting power table:

Watts – 3 minute test **MUST** be over 280 W

120	140	160	180	200	220	240	260	280	300
320	340	360	380	400	420	440	460	480	500

Example:

- Watts achieved in 3 minutes = 305 W round to nearest multiple of 20 = 300 W
- Count back 10 stages (include the 300 W as first stage)
- Starting power for the test 120 W
- Test would start at 120 W and ramp by 20 W every minute.
- If you achieve over 420 W in your 3 minute test use 240 W as the start point for your ramp test.

Female ramp test table:

Watts – 3 minute test **MUST** be over 215 W

80	95	110	125	140	155	170	185	200	215
230	245	260	275	290	305	320	335	350	375

Example:

- Watts achieved in 3 minutes = 260 W round to nearest multiple of 15 = 260 W
- Count back 10 stages (include the 260 W as first stage)
- Starting power for the test 125 W
- Test would be start at 125 W and ramp by 15 W every minute.
- If you achieve over 320 W in your 3 minute test use 185 W as the start point for your ramp test.
- The starting power for the British Cycling ramp test is depend on gender, weight and cycling ability. For completeness the gender, weight and cycling ability and starting power related tables are shown below.



Male – starting power in Watts based on weight and ability – ramp by 20 W every minute

Weight (kg)	Club Level	National Level	World Class Level
<50	120	140	160
50-59	140	160	180
60-69	160	180	200
70-79	180	200	220
80+	200	220	240

Female – starting power in Watts based on weight and ability – ramp by 15 W every minute

Weight (kg)	Club Level	National Level	World Class Level
<45	80	95	110
45-49	95	110	125
50-54	110	125	140
55-59	125	140	155
60-64	140	155	170
65+	155	170	185

Conducting A British Cycling Ramp Test

1. Set the air resistance lever at level 1 and warm up for 5 minutes at low intensity to moderate intensity with a cadence of 70 to 90 rpm.
2. A heart rate monitor (Polar [uncoded] with heart rate receiver, or a coded ANT or ANT+SPORT heart rate chest belt – Suunto or Garmin) is required.
3. From the Main menu go to Setup select HR and press ENTER this goes to the HR setup screen, select ANT chest belt or Polar un-coded chest belt (not forgetting to connect the HR Interface cable for Polar) and follow the instructions on the display.
4. When connected press ESC until the display returns to the Main menu. The HR belt is now connected. Press ESC until the display returns to the Main menu.
5. In the Main menu select Recall and the Set split. Set the split intervals for 1 minute. Press ESC until the display returns to the Main menu.
6. From the Main menu select Just ride. Select the Watts display screen.
7. Use the table below to work out the air resistance settings and cadence to use for this test.
8. You may need someone to assist you and keep you on track.
9. Pedal in a seated position for 1 minute at the starting power.
10. Increase the air resistance setting and cadence as necessary every minute to ensure an approximate 20 W increase in power (W) output very minute for males and 15 W for females.

11. Keep increasing the power (W) output by 20W (male) or 15W (female) every minute until you cannot complete a full minute at the ramp level (only complete minutes count).
12. Record: ** Highest Power average (W) achieved in the final complete minute – this is the estimate of your maximum minute power (use Recall to get this information) ** Note the maximum heart rate that you achieved (you will need to watch for this visually during the test) – this is the estimate of your maximum heart rate

Record the data for each complete minute for comparison against future retests - use the Recall Summary to get this information:

- Power average
- Average cadence
- Average HR

Apply your maximum minute power and maximum heart rate to the table on the Heart Rate and Power Training Zones page (p18).



Air Resistance Setting And Cadence Recommendations - British Cycling Test on a Wattbike Pro

Male Ramp test on a Wattbike Pro

Resistance levels for this test depend on your cadence preference. There are a number of ways of conducting a ramp test. However for the purposes of this Guide we recommend a maximum cadence range of 90-100 for this test although for some of the lower starting powers a cadence of < 90 may be needed.

For completeness we show below alternative ways of performing a ramp test.

To complete the ramp test at a set resistance level and increasing cadence
Example:

- Starting power 120 W
- 8 stages 120 W to 260 W on air resistance setting 1 cadence range 82-113
- 12 stages 120 W to 300 W on air resistance setting 2 cadence range = 79-114

To complete the ramp test in a restricted cadence range:
Example:

- Cadence restricted to max of 100
- Starting power 120 W
- 8 stages 120 W to 260 W on air resistance setting 3 cadence range 73-100
- 12 stages 120 W to 300 W on air resistance setting 4 cadence range = 69-100

To complete the ramp test using a fixed cadence
Example:

Fixed cadence of 90 (or nearest cadence level) – this can only be achieved if starting power is greater than 160 W (lower starting powers need a lower cadence). To do a fixed cadence test requires the air resistance setting to be moved at each stage.

8 stages 160 W to 300 W

Watts	160	180	200	220	240	260	280	300
Air Resistance	1	2	3	4	4	5	5	6
Cadence	92	89	91	89	92	89	92	90



12 stages 160 W to 380 W

Watts	160	180	200	220	240	260	280	300	320	340	360	380
Air Resistance	1	2	3	1	1	5	5	6	6	7	8	9
Cadence	92	89	91	89	92	89	92	90	92	91	91	91

Note for males 90 cadence restriction is only possible up to 400 W so a 12 stage test with a starting power of 180 W using the air resistance settings 1 to 10. For tests with a starting power of 200 W to 240 W a combination of the air resistance and magnetic brake are needed if cadence is fixed – email Wattbike for further information

info@wattbike.com

Male starting power - ramp rate 20 W every minute

Watts	1	2	3	4	5	6	7	8	9	10
120	82	79	73	69	65	64	62	60	59	58
140	87	84	80	73	69	68	66	64	62	61
160	92	89	84	79	73	71	69	67	66	65
180	96	93	87	82	76	74	72	71	69	67
200	103	98	91	86	79	77	75	73	72	70
220	106	101	94	89	84	80	78	76	74	73
240	110	105	97	92	87	82	80	79	77	75
260	113	108	100	94	89	85	83	81	79	77
280	116	111	103	97	92	87	85	83	81	79
300	119	114	105	100	94	90	87	85	83	81
320	122	116	108	102	97	92	89	87	85	83
340	125	119	110	104	99	94	92	89	87	85
360	128	124	113	106	101	96	93	91	89	87
380	130	126	115	109	103	98	95	93	91	89
400	133	129	117	111	105	100	97	95	93	91
420	135	131	121	113	107	103	99	97	94	92
440	138	133	123	115	109	104	101	98	96	94
460	140	135	125	117	110	106	102	100	98	95
480	142	137	127	118	112	106	104	101	99	97
500	144	140	129	120	114	110	106	103	101	98

It's far easier to conduct this test by selecting a cadence progression that allows you to leave the resistance setting at the same level throughout the test or a cadence that needs the minimum number of resistance settings. We recommend that in general cadence should be kept in the range of 90-100 although for some of the low powers a lower cadence less than 90 may be needed. For higher powers a greater range of resistance settings may be needed to get the cadence/power combination needed.

For example:

- 8 stages from 120 W to 260 W can be achieved by increasing the cadence for 73 at 120 W to 100 cadence at 260 W leaving the resistance setting at level 3 throughout the whole of the test.



- 12 stages from 120 W to 340 W can be achieved using resistance setting 5 (cadence 65 to 99) or resistance setting 4 (cadence 65 to 95).
- Chose the cadence range and resistance setting that reflects your cadence style.

Female Ramp test on a Wattbike Pro

Resistance levels for this test depend on your cadence preference. There are a number of ways of conducting a ramp test:

To complete the ramp test at a set resistance level and increasing cadence
Example:

- Starting power 80 W
- 8 stages 80 W to 185 W on air resistance setting 1 cadence range 69-100
- 12 stages 80 W to 260 W on air resistance setting 2 cadence range = 66-108 OR air resistance setting 3 cadence range = 62-100

To complete the ramp test in a restricted cadence range
Example:

- Cadence restricted to max of 100
- This can be achieved for all the starting power levels for female cyclists i.e. up to a starting power of 185 W for 8 to 12 stages

To complete the ramp test using a fixed cadence
Example:

Fixed cadence of 90 (or nearest cadence level) – this can only be achieved for starting power greater than 155 W (lower starting powers need a lower cadence). To do a fixed cadence test requires the air resistance setting to be moved at each stage

8 stages 155 W to 275 W

Watts	155	170	200	215	230	245	260	275
Air Resistance	1	2	3	4	4	4	5	5
Cadence	91	91	91	88	90	93	89	91

12 stages 155 W to 335 W

Watts	155	170	200	215	230	245	260	275	290	305	320	335
Air Resistance	1	2	3	4	4	4	5	5	6	6	7	7
Cadence	91	91	91	88	90	93	89	91	88	90	89	91

Female starting power - ramp rate 15 W every minute

Watts	1	2	3	4	5	6	7	8	9	10
80	69	66	62	59	56	55	52	52	51	49
95	74	71	67	63	60	59	56	55	54	53
110	79	76	71	67	63	62	60	58	57	56
125	84	80	74	70	66	65	63	61	60	59
140	87	84	80	73	69	68	66	64	62	61
155	91	88	83	76	72	70	68	66	65	64
170	97	91	85	81	76	73	71	69	68	66
185	100	95	88	83	77	75	73	71	70	68
200	103	98	91	86	79	77	75	73	72	70
215	106	101	93	88	83	79	77	75	74	72
230	108	105	96	90	85	81	79	77	76	74
245	111	105	98	92	87	83	81	79	77	76
260	113	108	100	94	89	85	83	81	79	77
275	116	110	102	96	91	87	85	83	81	79
290	118	112	104	98	93	88	86	84	82	80
305	120	114	106	100	95	90	88	86	84	82
320	122	116	108	102	97	92	89	87	85	83
335	124	118	110	104	98	93	91	89	87	85
350	126	122	112	105	100	95	93	90	88	86
365	128	124	113	107	101	96	94	92	90	88

It's far easier to conduct this test by selecting a cadence progression that allows you to leave the resistance setting at the same level throughout the test or a cadence that needs the minimum number of resistance settings. We recommend that in general cadence should be kept in the range of 90-100 although for some of the low powers a lower cadence less than 90 may be needed. For higher powers a greater range of resistance settings may be needed to get the cadence/power combination needed.

Example:

- 8 stages from 125 W to 230 W can be achieved by increasing the cadence for 74 at 125 W to 96 cadence at 230 W leaving the resistance setting at level 3 throughout the whole of the test
- 12 stages from 125 W to 260 W can be achieved using resistance setting 3 (cadence 74 to 100) or resistance setting 4 (cadence 70 to 94)
- Chose the cadence range and resistance setting that reflects your cadence style



20 Minute High Percentage of Maximum Minute Power Test

This is a test for experienced cyclists only (used only for Training Plans 4 & 5 and the Winter Triathlon Training plan of this Guide). It is usually conducted at 75-80% of maximum minute power (Zone 5 heart rate and power training Zone) and measures improvement in sustaining a high percentage of maximal aerobic power.

This is a progress check test so cyclists should have first conducted the 3 minute aerobic test to establish maximum minute power and maximum heart rate to establish heart rate and power training Zones. For a more detailed analysis consider live recording your tests in Wattbike Expert Software or transferring the data to the software for later analysis.

All your test results can be stored in the Wattbike Expert database for future comparison.

Conducting the 20 minute test

1. Warm up for 10-20 minutes at low intensity to moderate intensity with a cadence of 70 to 90 rpm. Include 3 x 6 second high cadence sprints in your warm up.
2. From the Main menu select Workout (down button), press ENTER. Select New workout (down button) and set up a New workout for a time of 20 minutes.
3. A heart rate monitor (Polar [uncoded] with heart rate receiver, or a coded ANT or ANT+SPORT heart rate chest belt – Suunto or Garmin) is required.
4. From the Main menu go to Setup select HR and press ENTER this goes to the HR setup screen, select ANT chest belt or Polar un-coded chest belt (not forgetting to connect the HR Interface cable for Polar) and follow the instructions on the display.
5. When connected press ESC until the display returns to the Main menu. The HR belt is now connected.
6. Press ESC until the display returns to the Main menu.
7. From Custom workout (Main menu – Workout – Custom) select the 20 minute workout. Select the Watts display screen (consider using these Watts with the Polar Graph display to look at left/right leg symmetry and pedalling technique during the test).
8. Set the air resistance lever to the required level.
9. From a static starting position pedal, in a seated position at a cadence (rpm) that can be maintained for 20 minutes (recommended 90-100 rpm).
10. Record:
 - Power average (W) - (use Recall to get this information - also note the average cadence)
 - Use the Split function in Recall to record the average heart rate for each minute



Remember that within the calibration range of each Wattbike and, for every air resistance setting of the Wattbike and cadence combination the Watts output is known. This makes it relatively simple to set the resistance and cadence to achieve a required output.

The tables below (rounded to nearest 5 W) approximate the power output in Watts for selected combinations of cadence and air resistance settings, for 85 -105 revolutions per minute on the Wattbike Pro and Wattbike Trainer.

Whilst the tables show all the air resistance settings from 1 to 10 it is anticipated that for most people the most effective setting will be in resistance range 1-5 on the Wattbike Pro (in exceptional circumstances powerful cyclists may need a higher resistance setting) with the full range of air resistance settings available on the Wattbike Trainer.

Wattbike Pro

rpm/resistance	1	2	3	4	5	6	7	8	9	10
85	130	145	170	195	225	260	275	295	320	340
90	150	165	200	235	265	300	325	350	375	390
95	175	185	225	265	310	350	375	400	425	450
100	195	215	260	310	355	395	430	465	500	520
105	210	230	295	350	400	445	490	525	565	600

Wattbike Trainer

rpm/resistance	1	2	3	4	5	6	7	8	9	10
85	75	80	100	115	130	145	160	170	180	190
90	85	95	115	135	150	170	185	200	215	225
95	100	110	130	155	175	200	215	230	245	260
100	110	125	150	175	200	225	245	265	285	300
105	125	140	170	200	230	260	280	300	325	340

Careful selection of the air resistance setting and cadence range is important as the best result is achieved by maintaining constant cadence and power (Watts) output throughout the whole 20 minutes of the test.



Example:

Maximum minute power 260 W.

80% Power for the 20 minute test	= 208 W
Resistance setting on Wattbike Pro at 90 cadence	= 3 (200 W)
Resistance setting on Wattbike Pro at 95 cadence	= 2/3 (190 W – 225 W)
Resistance setting on Wattbike Pro at 100 cadence	= 2 (215 W)
Resistance setting on Wattbike Trainer at 90 cadence	= 8 (200 W)
Resistance setting on Wattbike Trainer at 95 cadence	= 6 (200 W)
Resistance setting on Wattbike Trainer at 100 cadence	= 5 (200 W)



Pedalling Technique Test

Fundamental to the training plans in this Guide is the development of good pedalling technique. You should read this section carefully before you commence your Wattbike training plan.

One of the unique features of the Wattbike is the ability to monitor your pedalling technique as you ride. This is shown as a graph on the Wattbike Performance Computer – we call it the Wattbike Force Curve or Polar graph.

The Wattbike Force Curve shows two things:

- Force applied to the pedals
- Position of the pedals when applying this force on the left and right leg downstroke (angle of peak force) – when using Wattbike Expert software

The left hand side is the left leg downstroke starting at the top of the graph (12 o'clock position) and finishing at the bottom of the graph (6 o'clock position)

The right hand side is the right leg downstroke starting at the bottom of the graph (6 o'clock position) and finishing at the top of the graph (12 o'clock position)

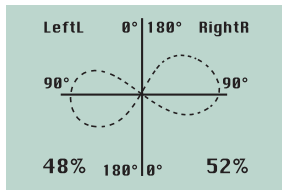
The key measures you should use to assess your pedalling technique are:

- Left and right leg symmetry (50%/50% balance)
- Left and right leg angle to peak force (the same angle for each leg) – when using Wattbike Expert software
- The overall shape of the Polar graph

Conducting the Pedalling Technique Test

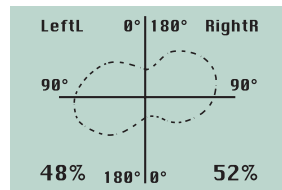
1. Set the air resistance lever at level 1. Once you are happy with the shape at air resistance setting 1 you can progress to setting 2 and upwards.
2. From the Main menu select Workout (down button), press ENTER. Select New workout (down button) and set up a New workout for a time of 3 minutes.
3. From Custom workout (Main menu – Workout – Custom) select the 3 minute workout.
4. Select the Polar graph screen.
5. From a static starting position pedal, in a seated position at a cadence (r/m) that can be maintained for 3 minutes (recommended 70-90).

6. Observe your basic pedalling shape:



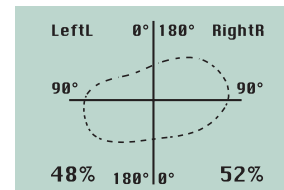
The 'Figure of Eight' - Beginner

This shape is typical of a strong drive and poor recovery



The 'Peanut' - Good Cyclist

This shape is typical of a strong drive and good recovery



The 'Sausage' - Elite Cyclist

This shape is typical of a very effective cycling technique

For more information on the basic shape please see the Pedalling Technique - What the Polar View Shapes Mean (p71).

Pedalling Technique Training Sessions

There are many opportunities within the training plans to practice effective pedalling technique. Whilst you should always think and practice pedalling technique the low intensity (Z1 and Z2 and even into Z3) Wattbike sessions can be changed to pedalling technique sessions.

Example:

From training plan 1 – 20' Z1 FoP (focus on pedalling) can be split into 5 x 4', 2' rest between intervals, cadence increasing for each interval.

Interval 1 at 70 cadence raising the cadence by 5 pedal revolutions for each subsequent interval – 70, 75, 80, 85, 90 .

Depending on your maximum minute power higher cadence pedalling technique sessions are possible.

Example:

From training plan 5 – 30' Z1 for a cyclist, with a maximum minute power of 400W the session could be split 6 x 5', 2' rest between intervals, cadence increasing for each interval – there is more flexibility in the resistance setting although all pedalling technique sessions should start at resistance level 1 on a Wattbike Pro.

Once the technique has been mastered at resistance level 1, the session can be repeated at higher settings.

In this example interval 1 could be at 85 cadence with subsequent intervals at 90, 95, 100, 105, 110 – at 110 cadence on resistance setting 1, on a Wattbike Pro, this cyclist would be producing 240 W i.e. 60% of maximum minute power of 400 so just into their Z3 heart rate and power training Zone.

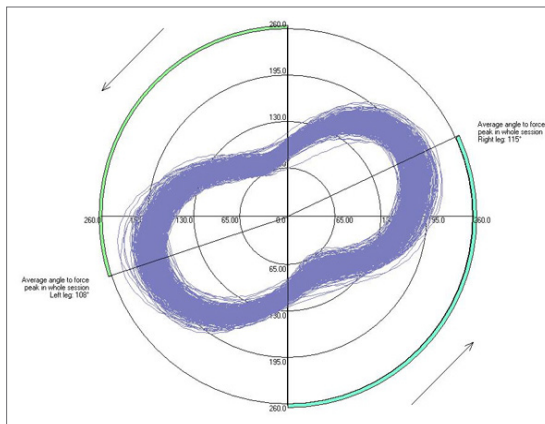
The overriding consideration is to be able to produce a consistent shape with good balance (close to 50/50 and with an equal angle of peak force in each leg) at all appropriate cadence levels and resistance settings in each training Zone.

Intervals can be shorter, if just beginning or longer if you are more experienced. The key to getting an effective pedalling technique is usually in the 'scrape back' i.e. imagine 'scrapping mud off the sole of the foot' at the bottom of the pedal stroke to ensure a smooth continuous pedalling action.

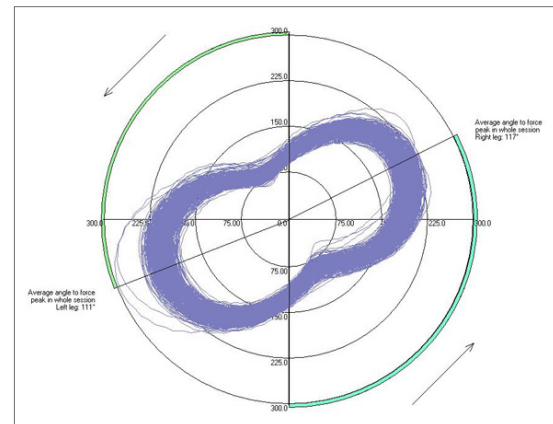
The Polar graphs below show a real pedalling technique session by a triathlete at resistance setting 4, 3 x 7', 2 rest between intervals at 85, 90 and 95 cadence (power 195 W, 230 W and 265 W). Note the similarity of shape and angle of peak force at each cadence level.

Examples of pedalling technique at different resistance settings and cadence levels are shown below – these are taken from an elite cyclist undertaking a step test. Note at lower powers (up to 250 W) the difficulty in maintaining the exact power output – although the overall shape is maintained.

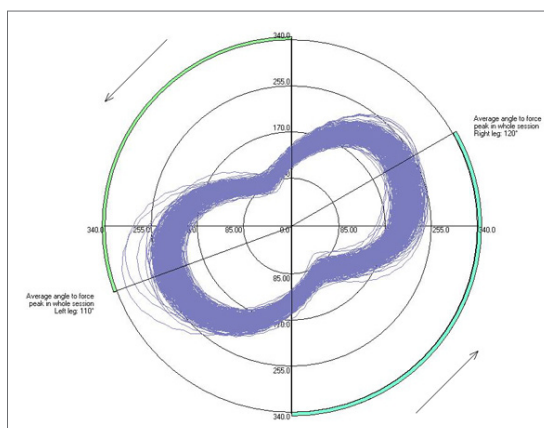
Setting 4,
Cadence 85, Power Average 195W



Setting 4,
Cadence 90, Power Average 230W

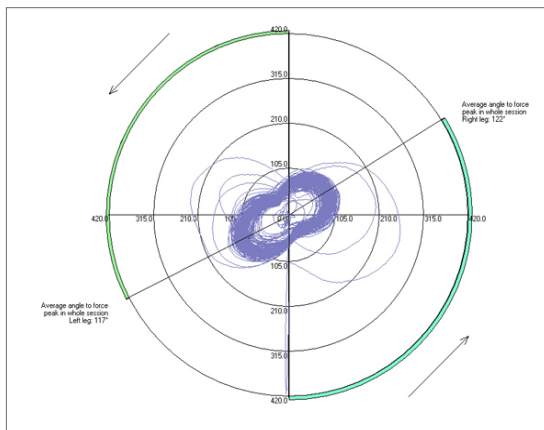


Setting 4,
Cadence 95, Power Average 265W

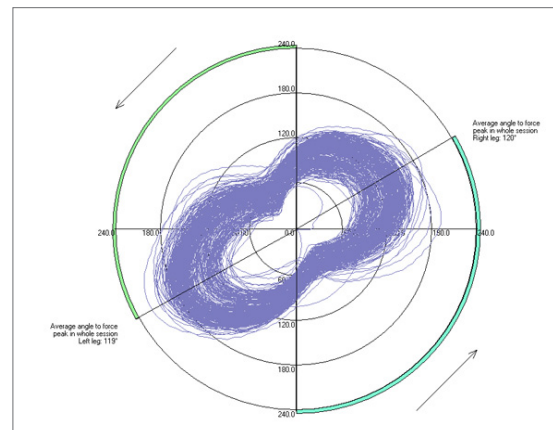


At the higher power levels 350 upwards the rider was more comfortable with the resistance level and cadence and even when standing up on the pedals was able to maintain a consistent shape, angle of peak force and cadence.

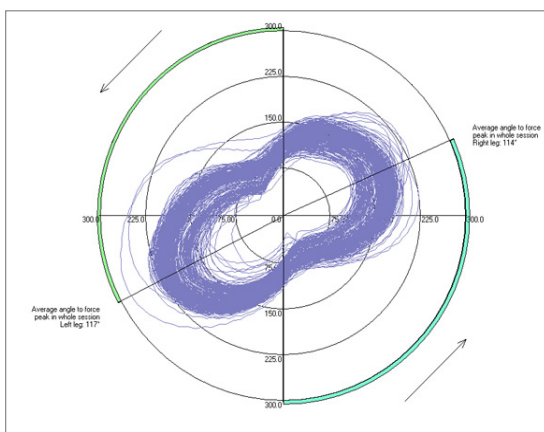
Setting 2,
74 cadence, power 100 W



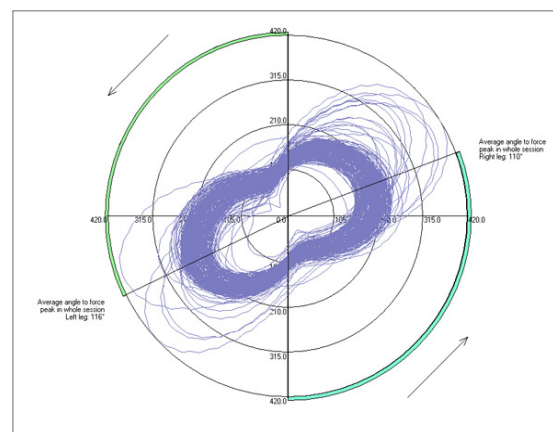
Setting 3,
79 cadence, power 150 W



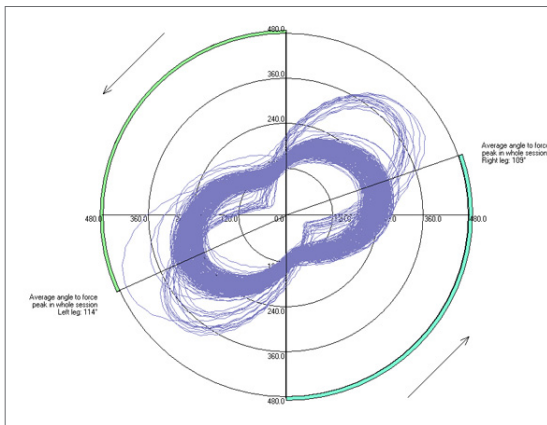
Setting 4,
84 cadence, power 200 W



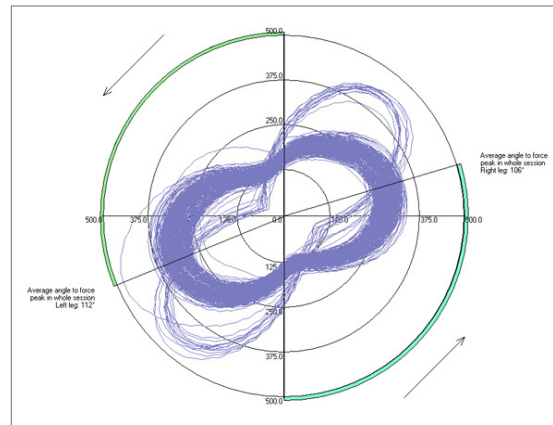
Setting 6,
84 cadence, power 250 W



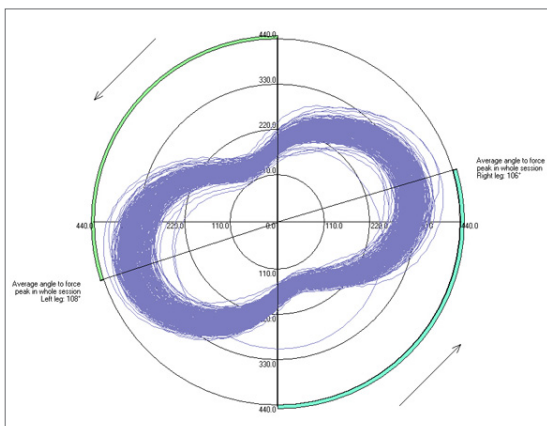
Setting 7,
87 cadence, power 300 W (seated and
standing)



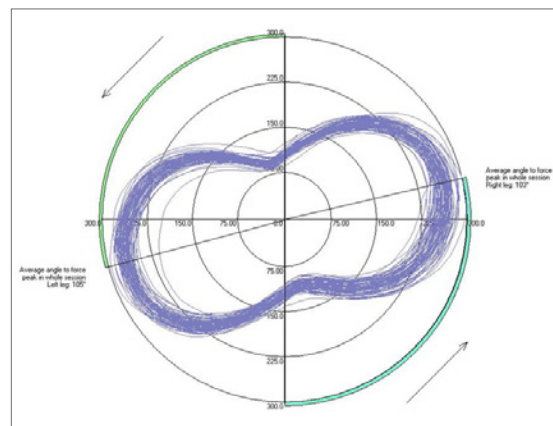
Setting 9,
88 cadence, power 350 W (seated and
standing)



Setting 10,
90 cadence, power 400 W



Setting 10,
144 cadence, power 1500 W Performed
by a World Class Sprinter



Peddalling Technique - What the Polar View Shapes Mean

One of the unique features of the Wattbike is the ability to monitor your cycling technique as you ride. This is shown as a force curve on the Wattbike Performance Computer known as the Polar View. The Polar View shows the force applied to the pedals and the position of the pedals when applying this force.

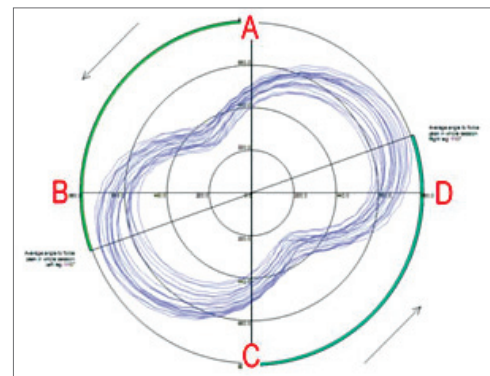
When cycling, you can play around with the graph – pushing on the left leg will create a large force shape on the left, pushing hard on the right leg will enlarge the graph on the right. You see a percentage beneath each side, telling you how much power each leg is generating. Standing up and altering your cycling technique will produce a change in the graph.

How to read the graph

The Polar View shows the force the rider applies as the pedals go round. There are 4 distinct points in the pedal stroke which is explained below.

Where the pedals are:

- Point A - Both pedals are in a vertical line. Your left leg is at the highest point; your right leg is vertical at its lowest point.
- Point B - Both pedals are horizontal, the left leg on the drive phase – the right leg on the recovery phase
- Point C - Both pedals are vertical. Your left leg is at the bottom of the revolution and your right leg is at the top
- Point D - Both pedals are horizontal, the right leg on the drive phase – the left leg on the recovery phase



What your legs are doing:

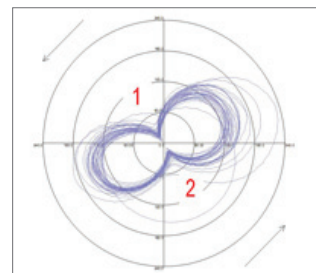
- Moving from point A to point B - As you start to drive with your left leg the graph moves anti-clockwise from A to B. The left leg begins to apply force to the pedals, the right leg is finishing the drive phase and beginning the recovery
- Moving from point B to point C - The most powerful part of the left-leg drive. Most riders normally reach their most powerful point just after the horizontal. As the left leg gets towards vertical again (point C) the power normally starts to come off as the rider transitions from left-leg drive to right-leg.

- Moving from point C to point D - The right leg begins to apply force to the pedals, the left leg is finishing the drive phase and beginning the recovery
- Moving from point D to point A - The most powerful part of the right-leg drive. Most riders normally reach their most powerful point just after the horizontal. As the right leg gets towards vertical again (point A) the power normally starts to come off as the rider transitions from right-leg drive to left-leg.

Example shapes

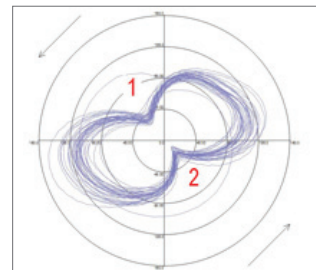
The Figure of Eight - Beginner

This cyclist losing too much pedal momentum on the transition from right-leg to left-leg (point 1) and left-leg to right-leg (point 2). With virtually no pull up during the recovery. Tip: Being properly attached in the toe cages or using cycling shoes ot help pulling up during the recovery.



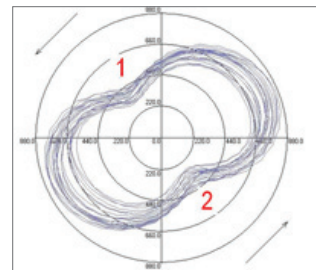
The Peanut - Good

This cyclist maintains some pedal momentum between leg drives. However, there is still a noticeable loss of momentum – especially since at point 2 there is a larger dead spot than at point 1. Tip: Imagine scraping mud of the ball of your shoes to help extend the leg drive and improve the transitions.



The Sausage - Elite

The cyclist has a large rounded shape, which is consistent, balanced between each leg, and he maintains good pedal momentum throughout. Typical shape of a strong drive and a balanced recovery.





Angle of peak force

The angle of peak force should be the same in each leg. However the actual angle of peak force is dependent upon a number of things - your cycling position, whether in a seated or standing position and whether using high/low resistance settings and/or high or low cadence.

Different combinations will have different physiological effects, matching your heart rate and power training Zones to the resistance and cadence levels (use the tables in this guide to help) is a key component of getting the best out of your Wattbike training.

Ten ways to improve your force curve

1. As a first step check your cycling position – incorrect cycling position can affect both the downstroke and upstroke phases.
2. Irrespective of your force curve make sure you are applying force to the pedals evenly with each leg. The left/right leg % should be as close to 50/50 as possible (it will fluctuate but try to keep in the range 48%-52%).
3. Consider investing in a good pair of cycling shoes. The use of training shoes will, generally always compromise your force curve as they make it difficult to fully implement the full power and recovery phases.
4. To practice pedalling don't stand up on the pedals unless it is a specific session you need to do.
5. A 'figure of eight' shape may indicate too high a resistance setting forcing you to concentrate solely on the downstroke – power phase preventing upstroke momentum. Lower the resistance to a level which allows you to improve your force curve to optimum. Concentrate on 'scrapping the mud off the sole of the foot' at the bottom of the pedal revolution.
6. Note that the Wattbike can be used for high cadence low wattage at one extreme and low cadence (r/m) high wattage at the other. Optimum leg speed is important. Experiment with different cadences and resistance settings. Cadence range can vary from 50-200 depending on the type of cycling you do.
7. Set the Wattbike Performance Computer to display the Polar Graph when you do a workout. You can set the text view you want on the right hand side of the display by pressing the ENTER button. This will constantly remind you to focus on effective pedalling.
8. If you have a laptop set up the Polar view in the Wattbike Expert Software. In addition to showing your force curve you can also see your angle of peak force and set the display bar at the bottom of the screen to show all the left and right leg parameters.



9. Set yourself a specific cycling effectiveness workout where you concentrate solely on improving your pedalling action and force curve rather than on distance, speed, watts, HR etc. Split the workout into short intervals and gradually expand the time of each interval as you improve. For example:
 - 5 x 4 minutes - 1 minute rest between each interval
 - 4 x 5 minutes - 1 minute rest between each interval
 - 2 x 10 minutes – 1 minute rest between each interval
10. Then try a 20 minute session holding the force curve for 20 minutes



The Training Plans



Contents

Training Session Terminology	93
Road Rides	93
Flat Terrain	93
Varied Terrain.....	93
Hilly	93
Include some hills	94
The Plans	96

Training Session Terminology

Use the following glossary to understand the requirements of the different type of session.

Road Rides

All long road rides above 2.5 hours are aimed at general conditioning to build endurance which is an important requirement for completing a sportive type event. Simply put, you need to spend enough hours in the saddle to prepare you to complete the course.

During all road rides, it is important to eat and drink throughout – so always have food with you and aim to drink a 500ml bottle every 1 – 1.5 hrs. You should finish this ride feeling tired but not exhausted and the next day should be a rest day, which means either a day off or an easy recovery session at Z1.

Where possible complete your longest road ride of each week in a group. This will help develop your group riding skills and also enable a longer distance to be covered for the same amount of effort of a shorter ride. It is important for riders on training plans 1 – 3 to ensure a few long group rides are included before taking on the event. These rides will also provide you with the confidence to successfully complete the event.

Road rides are notated to be carried out on either flat or varied terrain or may be detailed as 'hilly'. The ability for you to include the rides as detailed will be somewhat determined by the area that you live / ride. However, where if possible, use the below to guide you to build the routes:

Flat Terrain:

80% flat. You would be able to ride 80% of the route sitting in the saddle and using just 3 or 4 different gears. You will need to increase the pace to push up through your training Zones.

Varied Terrain:

Rolling terrain, not too structured, avoid really big hills. Let the terrain dictate the Zones whilst riding 'steady' and not attacking the hills. Ride easy on the flat sections.

Hilly:

60% - 80% hilly. This type of ride will require a lot of climbing, and lots of time out of the saddle, along with a lot of time descending. You will need to use many gears, and the ride will see you spend more time in the higher training Zones than the varied terrain



due to the nature of the course. These rides will build strength as well as endurance and 'top end' fitness.

Include some hills:

This is a road ride that is mainly on flat or rolling terrain, but will have some hills within it that will take you high up the training Zones. As a guide, look to include two hills for every one hour ridden (note the ride is not a structured training session however so you do not have to be too strict about when the hills come in the ride).

AT Interval session 1 – e.g. AT session with 4 efforts.

10' progressive warm up to Z3, 2' easy before first interval then 4 x 4' intervals at AT (Z4/Z5 Training Zone) with 4' recovery between intervals, 10' cool down.

AT Interval session 2 – e.g. AT session 2 with 3 efforts.

As AT Interval session 1 but with 2' recovery between intervals. Warm up for AT (Z4/Z5 Training Zone) Interval sessions 1 & 2. 3' easy pedalling, 5' progressive to Z4/Z5, 2' easy.

Cadence session (seated) – e.g. 30' cadence session.

30' Z1 with 4 rev outs (acceleration to maximum cadence on resistance level 1) at 10', 15, 20, 25' – rev outs 15-30 seconds in duration.

FoP - Focus on Pedalling technique – e.g. 20' Z1 FoP.

Power session 1 – e.g. Power session 1 with 4 efforts.

10' warm up then 4 x 300m efforts accelerating flywheel from 30 rpm to as fast as possible. If max cadence reached within 200m then increase resistance. Fully recover between efforts – 3'-5' recovery between each effort, 10' cool down. Set the Wattbike resistance level at your Z4/Z5 level.

Fully recover between efforts – 3'-5' recovery between each effort, 10' cool down.

Power session 2: - e.g. Power session with 4 efforts.

10 minute warm up then 4 x 2' intervals with 4' recovery between intervals.

Over geared – 80 rpm at Z4/Z5 – accelerating the last 30 seconds to 100+ rpm at Z5, 10' cool down. See the tables of power, resistance and cadence. Set the resistance lever to the level that delivers your Z4/Z5 power Zone at 80 rpm.



Progressive session: - e.g. 45' PS Z1-Z3.

Increasing resistance level and/or cadence that increases HR and power from your Z1 to Z3 training Zones. Includes warm up and cool down.

Example 5' warm up then 10' at Z1, 10' at Z2, 10' at Z3, 10' cool down.

Rev outs: - e.g. 60' inc 4 rev outs downhill (downhill sprints).

Rev out is acceleration to maximum cadence at 15', 25', 35' and 45', rev outs of 10-20 seconds (build up to 20 seconds; important that cadence is as high as possible & remains high for duration of rev out).

Strength session (seated): - e.g. Strength efforts with 3 efforts.

10' progressive warm up to Z3 followed by 5' recovery, then 3 x 3' at Z3 60-70 cadence, 5' recovery between efforts, 10' cool down. See the tables of power, resistance and cadence. Set the resistance lever to the level that delivers your Z3 power Zone at 60-70 rpm.

Where sets of efforts are required (2 sets of 2 OR 2 sets of 3) recovery is 5' between sets.

Training Plans

The Sportive Training plans have been put together by British Cycling Talent Team Manager, Gary Coltman, and Wattbike's resident Sport Scientist Eddie Fletcher.

The Plans

The plans in this Guide are designed to prepare a cyclist for a Sportive event (or equivalent) and for Triathletes there is a specially designed Winter Training Plan.

There are 5 different plans - which plan you adopt depends not only on your ability and fitness level but also on the amount of cycling you have previously done. However for Plans 4 and 5 you do need to be a capable cyclist - within each Fitness level there is a recommended ability level in terms of maximum minute power (MMP) and power to weight ratio (PKg - the power to weight ratios are based on, male 70Kg and Female 55Kg).

The simplest way to start is to match up your fitness level with the training plans so that if you assess your fitness level as 1 you should start on training plan 1 and so on up to fitness level 5 and training plan 5 (subject to the maximum minute power restrictions). Each plan starts 16 weeks from your race day and is intended to be a menu of sessions that could be followed. The plans are general and not individual plans but they do have a structure that would be useful to follow at each level. As you progress it is possible to switch to a higher or lower level plan as appropriate. Be flexible in your approach to ensure you select the plan and sessions which match your fitness level and time availability.

- Plan 1 starts with 2 sessions in week 1 progressing to 3 sessions in week 2 and then to 4 sessions per week from week 7 onwards.
- Plan 2 starts with 3 sessions per week in weeks 1 to 3 progressing to 4 sessions per week from week 4 onwards.
- Plan 3 starts with 3 sessions per week in weeks 1 and 2 progressing to 4 sessions per week in weeks 3 to 5 and has an optional session 5 from week 6 onwards.
- Plan 4 starts with 4 sessions per week in weeks 1 to 3 progressing to an optional session 5 from week 6 onwards.
- Plan 5 is based on 5 sessions per week in weeks 1 to 7 progressing to 6 sessions a week from week 8 onwards.

Within each plan there are recommended minimum road and Wattbike sessions (shown in bold) with an alternative Wattbike session to substitute for the road sessions if you are unable to get out on the road (weather or time constraints) - however try not to miss the recommended road sessions if at all possible.



Plans 4 and 5 are more flexible - there is no suggested route through the mix of road and Wattbike sessions - experienced riders can mix and match - we suggest that a good mix would be a ratio of 3:1 / 4:1 road rides to Wattbike rides. For all plans do not miss the weekly long ride sessions (session 1). Each Plan has recovery weeks built into the Plan - recovery weeks should be treated as compulsory. Do not hesitate to take extra recovery days throughout the duration of any of the Plans if necessary.

Do not overreach, take a sensible approach to which plan you start on to avoid over training, fatigue, illness and injury. It is far better to start slowly and build your fitness at a lower level and then switch to a higher level plan as your fitness improves. It is acceptable to mix and match the Training Plans to suit your requirements although we do recommend that you try to adopt one of the plans in its entirety matching the plan to the fitness description level that best reflects your current training status.

Warning

The training plans in this Guide assume a basic to high level of fitness and should not be attempted if you are a beginner or have been recently ill or injured (use the estimated methods). If in doubt consult your Doctor before you commence a Wattbike test or training plan. The tests are not suitable for children or young adults under the age of 18 unless under supervision.



The Sportive Plan



Contents

Sportive Worked Example - Based on a Wattbike Pro	100
Example Training Sessions.....	101
The Training Plans	103
Level 1 - Weeks 1-4	103
Level 1 - Weeks 5-8	104
Level 1 - Weeks 9-12.....	105
Level 1 - Weeks 13-16.....	106
Level 2 - Weeks 1-4	107
Level 2 - Weeks 5-8	108
Level 2 - Weeks 9-12	109
Level 2 - Weeks 13-16.....	110
Level 3 - Weeks 1-4	111
Level 3 - Weeks 5-8	112
Level 3 - Weeks 9-12	113
Level 3 - Weeks 13-16.....	114
Level 4 - Weeks 1-4	115
Level 4 - Weeks 5-8	116
Level 4 - Weeks 9-12	117
Level 4 - Weeks 13-16.....	118
Level 5 - Weeks 1-4	119
Level 5 - Weeks 5-8	120
Level 5 - Weeks 9-12	121
Level 5 - Weeks 13-16.....	122



Sportive Worked Example - Based on a Wattbike Pro

Result of 3 minute aerobic test or a ramp test: (on a Wattbike Pro)

- Air resistance setting 3
- Cadence 100 cadence
- Maximum minute power 260 W
- Maximum heart rate 188 bpm

10 minute progress test settings: (on a Wattbike Pro)

- Air resistance 3
- Warm up power 130 W @ approximately 75 cadence r/m
- Test power 180 W @ approximately 87 cadence r/m

Heart rate and power training Zones:

Training Zone	Purpose	% MHR	HR (bpm)	% MMP	Power (Watts)
Recovery	Regeneration and recovery	< 60	< 113	< 35	< 91
1. Basic	Establish base endurance	60-65	113-122	35-45	91-117
2. Basic	Improve efficiency	65-75	122-141	45-55	117-143
3. Intensive	Improve sustainable power	75-82	141-154	55-65	143-169
4. Intensive	Push threshold up	82-89	154-167	65-75	169-195
5. Maximal	Sustain a high percentage of maximal aerobic power	89-94	167-177	75-85	195-221
6. Maximal	Increase maximum power output	>94	> 177	85-100	221-260
Supra-maximal	Increase sprint power output	N/A	N/A	> 100	> 260



Example training sessions taken from various Plans based on MHR 188 and 260 W MMP on a Wattbike Pro

A Recovery session - 30' Recovery:

- 30 minutes HR to 113 at 91 W at 70 cadence, this is air resistance setting 1 on a Wattbike Pro
- 70 cadence at air resistance setting 1 = 90 W approximately

A Zone 1 session - 45' Z1:

- 45' minutes HR 113-122 at 91-117 W at 70-80 cadence, this is air resistance setting 1 on a Wattbike Pro
- 70 cadence at air resistance setting 1 = 90 W approximately
- 75 cadence at air resistance setting 1 = 100 W approximately
- 80 cadence at air resistance setting 1 = 115 W approximately

A Zone 2 session - 45' Z2:

- 45 minutes HR 122-141 at 117-143 W at 80-90 cadence, this is air resistance setting 1 on a Wattbike Pro
- 80 cadence at air resistance setting 1 = 115 W approximately
- 85 cadence at air resistance setting 1 = 130 W approximately
- 90 cadence at air resistance setting 1 = 150 W approximately

A Zone 3 session - 60' Z2-Z3 majority of ride should be at Z2. Z2 section as above: Zone 3 section HR 141-154 at 143-169 W at 90-95 cadence, this is air resistance setting 1 on a Wattbike Pro.

- 90 cadence at air resistance setting 1 = 150 W approximately
- 95 cadence at air resistance setting 1 = 175 W approximately

A shorter higher intensity Zone 4 continuous or interval set – 30' Z4 :

- 30 mins HR to 154-167 at 169-195 W and 95-100 cadence, this is air resistance setting 2 on a Wattbike Pro
- 95 cadence at air resistance 1 = 175 W approximately
- 100 cadence at air resistance 1 = 190 W approximately

OR Power session with 4 efforts, 4 x 2' intervals with 4' recovery between intervals. Over geared – 80 rpm at Z4 – accelerating the last 30 seconds to 100+ rpm at Z5

- 80 cadence at air resistance setting 4 on a Wattbike Pro = 170 W approximately adjusting the air resistance setting to 3 for the last 30 seconds will deliver approximately 220 W at 100 cadence



A Zone 5 session - AT session with 4 efforts 4 x 4' intervals at AT with 4' recovery between intervals:

- HR 167-177 at 195-221 W at 100 + cadence, this is air resistance setting 1 on a Wattbike Pro
- 100 cadence at air resistance setting 1 = 190 W approximately
- 105 cadence at air resistance setting 1 = 210 W approximately

A Zone 6 session - there are no Z6 in these particular plans but for completion:

- 4-10 minutes intervals 177 + at 221-260 W at 100 + cadence, this is air resistance setting 2 on a Wattbike Pro
- 100 cadence at air resistance setting 2 = 210 W approximately
- 105 cadence at air resistance setting 2 = 230 W approximately
- 110 cadence at air resistance setting 2 = 260 W approximately

Depending on the type of training session required any combination of air resistance and cadence can be used to create the power output required. See the table of resistance setting, cadence and power on page 9.

The Wattbike can be used for high cadence low wattage at one extreme and low cadence high wattage at the other. A good general cadence rate is 70-110 rpm although depending on the circumstances cadence can vary from 50 to 200 rpm. On a Wattbike Pro for example 200 W can be delivered at air resistance setting 1 and a cadence just over 100 r/m. The cadence required to produce 200 W at air resistance settings 2 to 10 reduces progressively. At setting 5 the cadence requirement is about 80 r/m and at setting 10 only 70 r/m.



Sportive Training Plan - Level 1

Weeks 1 - 4



Week 1

Session	Outdoor	Wattbike
1		20' Recovery / Zone 1
2		20' Recovery-Zone 1
3		
4		
Total	40'	

Week 2

Session	Outdoor	Wattbike
1		20' Recovery / Zone 1
2		30' Recovery-Zone 1
3		20' Recovery / Zone 1
4		
Total	01:10	

Week 4

Session	Outdoor	Wattbike
1	45' - 60' Zone 1	30' Zone 1
2		20' Zone 1 with 1x5 mins Zone 2 Interval at 7.5
3		20' Zone 1 Focus on Pedalling Technique
4		
Total	1:10 - 1:25	

Week 3

Session	Outdoor	Wattbike
1	45' Recovery	30' Zone 1
2		20' Zone 1 Focus on Pedalling Technique
3		30' Zone 1
4		
Total	1:20 - 1:35	



Sportive Training Plan - Level 1

Weeks 5 - 8

Week 5

Session	Outdoor	Wattbike
1		30' Zone 1 with 1x5 mins Zone 2 interval at 12.5'
2	30' - 45' Recovery riding, flat terrain	20' - 30' Zone 1 higher cadence Focus on Pedalling Technique
3		30' Zone 1 with 1x5 mins Zone 2 interval at 12.5'
4		
Total	1:20 - 1:45	

Week 6

Session	Outdoor	Wattbike
1	45' Recovery	20' Zone 1
2		20' Zone 1 Focus on Pedalling Technique
3		3' TEST
4		
Total	1:00 - 1:25	

Week 7

Session	Outdoor	Wattbike
1		30' Zone 1
2	1:15 include some small hills - Zone 2 - Zone 5	20' Zone 1 with 1x10 mins Zone 2 Interval at 10'
3	45' Recovery	20' Zone 1 Focus on Pedalling Technique
4	60' include some small hills - Zone 2 - Zone 5	30' Zone 2
Total	1:50 - 3:30	

Week 8

Session	Outdoor	Wattbike
1	1:15 include some small hills - Zone 2 - Zone 5	45' Zone 2
2	45' Recovery	20' Zone 1 Focus on Pedalling Technique
3	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 1 - Zone 2
4		35' Zone 1 inc 2 x 5 mins Zone 3 intervals at 7.5' and 2.25'
Total	2:40 - 4:05	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 1

Weeks 9 - 12

Week 9

Session	Outdoor	Wattbike
1	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2
2		35' Zone 1 inc 2 x 5 mins Zone 3 intervals at 7.5' and 22.5'
3	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2
4		35' Zone 1 inc 2 x 5 mins Zone 3 intervals at 7.5' and 22.5'
Total	3:10 - 4:10	

Week 11

Session	Outdoor	Wattbike
1	2:00 flat terrain - Zone 1 - Zone 4	1:30 Zone 2
2		20' - 30' Zone 1 higher cadence Focus on Pedalling Technique
3	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2 - Zone 3
4	2:00 flat terrain - Zone 1 - Zone 4	1:30 Zone 2
Total	3:20 - 5:30	

Week 10

Session	Outdoor	Wattbike
1	1:45 flat terrain - Zone 1 - Zone 4	60' Zone 2
2		20' - 30' Zone 1 higher cadence Focus on Pedalling Technique
3	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2 include 10 minute progress check at the start
4	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2
Total	3:20 - 5:15	

Week 12

Session	Outdoor	Wattbike
1		45' Zone 1 inc 2 x 4 mins Zone 4 efforts at 15' and 27'
2		20' - 30' Zone 1 higher cadence Focus on Pedalling Technique
3	2:30 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 3
4		45' Zone 1 with 2 x 8 mins Zone 3 efforts at 6' and 30'
Total	4:20 - 4:30	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 1

Weeks 13 - 16

Week 13

Session	Outdoor	Wattbike
1	1:15 flat terrain - Zone 1 - Zone 4	45' Zone 2
2		45' Zone 1 with 2 x 4 mins Zone 4 intervals at 15' and 27'
3	3:00 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 3
4	1:15 flat terrain - Zone 1 - Zone 4	45' Zone 2
Total	0:28:12.5	

Week 14

Session	Outdoor	Wattbike
1	45' - 60' Recovery	30' Zone 1
2	4:00 include some hills - Zone 2 - Zone 6	
3	45' - 60' Recovery	30' Zone 1 include 10 minute progress check at the start
4	2:30 include some hills - Zone 2 - Zone 6	
Total	7:30 - 8:00	

Week 15

Session	Outdoor	Wattbike
1	4:00 include some hills - Zone 2 - Zone 6 group ride	
2	45' Recovery	20' Zone 1
3		45' Zone 1 with 2 x 8 mins Zone 3 efforts at 6' and 30'
4	1:15 flat terrain - Zone 1 - Zone 4	45' Zone 2
Total	5:50 - 6:45	

Week 16

Session	Outdoor	Wattbike
1	2:00 - 2:30 flat terrain - Zone 1 - Zone 4	60' Zone 2 - Zone 3
2		
3	60' Zone 1	30' - 45' Zone 1
4	EVENT	
Total	1:30 - 3:30	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 2

Weeks 1 - 4

Week 1

Session	Outdoor	Wattbike
1		30' Zone 1
2		20' Zone 1
3		30' Zone 1
4		
Total	01:20	

Week 2

Session	Outdoor	Wattbike
1		30' Zone 1 Focus on Pedalling Technique
2		20' Zone 1 with 1 x 5 mins Zone 2 efforts at 7.5' Zone 2 = Working, Feel warmer, Heart rate and respiration up, May sweat
3		30' Recovery - Zone 1 Focus on Pedalling Technique
4		
Total	1:10 - 1:25	

Week 3

Session	Outdoor	Wattbike
1		Test - 3 mins
2	60' flat terrain - Zone 1 - Zone 4	30' Recovery - Zone 1 Focus on Pedalling Technique
3	60' include some small hills - Zone 1 - Zone 5	20' Zone 1 with 1 x 5 mins Zone 2 efforts at 7.5' Zone 2 = Working, Feel warmer, Heart rate and respiration up, May sweat
4		
Total	1:20 - 2:30	

Week 4

Session	Outdoor	Wattbike
1		30' Recovery - Zone 1 Focus on Pedalling Technique
2	1:15 include some small hills - Zone 2 - Zone 5	30' Zone 2 inc 1 x 5 mins Zone 3 at 12.5'
3	45' Recovery - Zone 1 Focus on Pedalling Technique	20' Recovery - Zone 1
4	60' include some small hills - Zone 1 - Zone 5	30' Zone 2
Total	1:50 - 3:00	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 2

Weeks 5 - 8

Week 5

Session	Outdoor	Wattbike
1	1:15 include some small hills - Zone 2 - Zone 5	45' Zone 2
2	45' Recovery - Zone 1 Focus on Pedalling Technique	20' Zone 1
3	1:30 varied terrain Zone 1 - Zone 5	60' Zone 1 - Zone 2
4		35' Zone 1 inc 2 x 5 mins Zone 3 at 7.5' and 22.5'
Total	2:40 - 4:05	

Week 6

Session	Outdoor	Wattbike
1	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2
2		35' Zone 1 inc 2 x 5 mins Zone 3 at 10' and 25'
3	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2
4		35' Zone 1 inc 2 x 5 mins Zone 3 at 7.5' and 22.5'
Total	3:10 - 4:00	

Week 7

Session	Outdoor	Wattbike
1	1:45 flat terrain - Zone 1 - Zone 4	60' Zone 1 - Zone 2 include 10 minute progress check at the start
2		20' - 30' Zone 1 higher cadence Focus on Pedalling Technique
3	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2
4	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2
Total	3:20 - 4:15	

Week 8

Session	Outdoor	Wattbike
1	2:00 flat terrain - Zone 1 - Zone 4	1:15 Zone 2
2		20' - 30' Zone 1 cadence Focus on Pedalling Technique
3	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2 - Zone 3
4	2:00 flat terrain - Zone 1 - Zone 4	1:30 Zone 2
Total	4:35 - 6:00	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 2

Weeks 9 - 12

Week 9

Session	Outdoor	Wattbike
1	1:30 varied terrain - Zone 1 - Zone 5	45' Zone 1
2	45' Recovery - Zone 1 Focus on Pedalling Technique	20' Recovery - Zone 1 Focus on Pedalling Technique
3		3' Test
4		
Total	3:10 - 4:10	

Week 10

Session	Outdoor	Wattbike
1		20' - 30' Zone 1 higher cadence Focus on Pedalling Technique
2	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2 - Zone 3 majority of ride should be at Zone 2
3	1:30 Zone 1 - Zone 5 inc Strength Efforts - 3 x 3 min efforts at 35', 43' & 51' - strength effort, stay in the saddle, ride 2-3 sprockets higher than normal, try not too pull on bars too much	Strength session with 3 efforts (see Training Session Glossary)
4	2:00 flat terrain Zone 1 - Zone 4	1:30 Zone 2
Total	3:20 - 5:15	

Week 11

Session	Outdoor	Wattbike
1	2:00 include some hills - Zone 2 - Zone 6	60' Zone 1 - Zone 2 include 2 x 5 mins Zone 3 efforts at 20' and 32.5'
2	45' Recovery - Zone 1 Focus on Pedalling Technique include 10 minute progress check at the start	20' Zone 1
3	1:30 Zone 1 - Zone 5 inc Strength Efforts - 3 x 3 min efforts at 35', 43' & 51' - strength effort, stay in the saddle, ride 2-3 sprockets higher than normal, try not too pull on bars too much	Strength session with 3 efforts (see Training Session Glossary)
4	2:15 flat terrain Zone 1 - Zone 4	1:30 Zone 2
Total	3:40 - 6:30	

Week 12

Session	Outdoor	Wattbike
1	1:15 flat terrain - Zone 1 - Zone 4	45' Zone 2
2		45' Zone 1 with 2 x 4 mins Zone 4 efforts at 15' and 27'
3	3:00 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 3
4	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2
Total	4:00 - 6:30	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 2

Weeks 13 - 16

Week 13

Session	Outdoor	Wattbike
1	45' - 60' Recovery - Zone 1	30' Zone 1
2	4:00 include some hills - Zone 2 - Zone 6 up to 6:00 with group	45' Zone 1 with 2 x 4 mins Zone 4 intervals at 15' and 27'
3	45' - 60' Recovery - Zone 1	30' Zone 3
4	2:30 include some hills - Zone 2 - Zone 6	1:15 inc 4 x 5 min Zone 3 efforts at 20', 30, 40, 50
Total	3:45 - 8:00	

Week 14

Session	Outdoor	Wattbike
1	45' Recovery - Zone 1	20' Zone 1
2	2:30 include some hills - Zone 2 - Zone 6	1:15 Zone 1 - Zone 2 include 3x 5 min Zone 3 efforts at 22.5', 35' & 47.5'
3		20' - 30' Zone 1 higher cadence
4	1:30 varied terrain Zone 1 - Zone 5	60' Zone 2
Total	3:25 - 5:15	

Week 15

Session	Outdoor	Wattbike
1	4:00 include some hills - Zone 2 - Zone 5 - up to 6:00 with group	1:30 Zone 1 - Zone 2 include 4 x 10 min Zone 3 efforts at 22.5', 37.5', 52.5', 67.5'
2	45' Recovery - Zone 1 Focus on Pedalling Technique include 10 minute progress check at the start	20' Zone 1
3		45' Zone 1 with 2 x 8 mins Zone 3 efforts at 6' and 30'
4	60' flat terrain - Zone 1 - Zone 4	45' Zone 1 - Zone 2
Total	3:20 - 6:30	

Week 16

Session	Outdoor	Wattbike
1	2:00 - 2:30 flat terrain - Zone 1 - Zone 4	1:15 Zone 1 - Zone 2 include 3 x 5 min Zone 3 efforts at 22.5', 35', 47.5'
2		
3	60' flat terrain - Zone 1	30' - 45' Zone 1
4	EVENT	
Total	3:30	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 3

Weeks 1 - 4

Week 1

Session	Outdoor	Wattbike
1		30' Zone 1 Focus on Pedalling Technique
2		30' Zone 1 Focus on Pedalling Technique
3	1:30 varied terrain Zone 1 - Zone 5	60' Zone 1 - Zone 2
4		
5 (optional)		
Total	1:50 - 2:20	

Week 2

Session	Outdoor	Wattbike
1	1:15 varied terrain Zone 1 - Zone 5	45' Zone 2 - Zone 3
2		20' Zone 1 Focus on Pedalling Technique
3		45' Progressive Session Zone 1 - Zone 3
4		
5 (optional)		
Total	1:50 - 2:20	

Week 3

Session	Outdoor	Wattbike
1	60' flat terrain Zone 1 - Zone 4	40' Zone 2
2		30' Zone 1 Focus on Pedalling Technique
3	1:15 varied terrain Zone 1 - Zone 4	45' Zone 2
4		45' Progressive Session Zone 1 - Zone 3
5 (optional)		
Total	2:40 - 3:30	

Week 4

Session	Outdoor	Wattbike
1	1:15 varied terrain Zone 1 - Zone 5	45' Zone 2 - Zone 3
2		Strength session with 3 efforts (see Training Session Glossary)
3	1:15 flat terrain Zone 1 - Zone 4	45' Zone 2
4		45' Progressive Session Zone 1 - Zone 3
5 (optional)		
Total	3:00 - 4:00	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 3

Weeks 5 - 8

Week 5

Session	Outdoor	Wattbike
1	1:30 varied terrain - Zone 1 - Zone 5	60' Zone 2
2		Strength session with 3 efforts (see Training Session Glossary)
3	1:30 varied terrain Zone 1 - Zone 5	60' Zone 2
4	45' - 60' Recovery - Zone 1	30' Zone 1 Focus on Pedalling Technique
5 (optional)		
Total	3:15 - 4:30	

Week 7

Session	Outdoor	Wattbike
1	2:00 flat terrain - Zone 1 - Zone 4	1:15 Zone 2
2	1:30 Zone 1 - Zone 5 include Strength session with 3 x 3 min efforts at 35', 43', 51' - strength effort stay in the saddle ride 2-3 sprockets higher than normal try not to pull on bars too much	Strength session with 4 efforts (see Training Session Glossary)
3	2:00 flat terrain - Zone 1 - Zone 4	1:15 Zone 2
4	1:00 flat terrain - Zone 1 - Zone 4	45' Zone 2
5 (optional)	45' - 60' Recovery - Zone 1	30' Zone 1
Total	4:30 - 6:30	

Week 6

Session	Outdoor	Wattbike
1	1:45 flat terrain - Zone 1 - Zone 4	60' Zone 2
2	1:30 Zone 1 - Zone 5 include Strength session with 3 x 3 min efforts at 35', 43', 51' - strength effort stay in the saddle ride 2-3 sprockets higher than normal try not to pull on bars too much	Strength session with 4 efforts (see Training Session Glossary)
3	1:45 flat terrain - Zone 1 - Zone 4	45' Zone 2
4		45' Progressive Session Zone 1 - Zone 3
5 (optional)	45' - 60' Recovery - Zone 1	30' Zone 1
Total	3:45 - 5:45	

Week 8

Session	Outdoor	Wattbike
1	60' flat terrain Zone 1 - Zone 4	40' Zone 2
2	60' flat terrain Zone 1 - Zone 4	40' Zone 2
3		20' Test OR 10 mile TT
4		
5 (optional)		
Total	1:40 - 2:20	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 3

Weeks 9 - 12

Week 9

Session	Outdoor	Wattbike
1	2:00 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 3
2	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
3	1:30 flat terrain - Zone 1 - Zone 4	60' Zone 2
4		45' Progressive Session Zone 1 - Zone 4
5 (optional)	2:00 flat terrain - Zone 1 - Zone 4	1:15 Zone 2
Total	5:00 - 7:15	

Week 10

Session	Outdoor	Wattbike
1	2:30 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 3
2	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
3	1:30 flat terrain - Zone 1 - Zone 4	60' Zone 2
4		45' Progressive Session Zone 1 - Zone 4
5 (optional)	2:00 flat terrain - Zone 1 - Zone 4	1:15 Zone 2
Total	5:00 - 7:45	

Week 11

Session	Outdoor	Wattbike
1	2:45 include some hills - Zone 2 - Zone 6	
2	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
3	1:30 flat terrain - Zone 1 - Zone 4	60' Zone 3 - Zone 4
4	1:15 flat terrain - Zone 1 - Zone 4	45' Zone 2
5 (optional)	2:15 varied terrain inc some hills - Zone 1 - Zone 5	1:15 Zone 1
Total	6:15 - 9:15	

Week 12

Session	Outdoor	Wattbike
1	3:00 include some hills - Zone 2 - Zone 6	
2	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
3		45' Progressive Session Zone 1 - Zone 3
4	Power session 2 include 4 efforts (see Training Session Glossary)	Power session 2 include 4 efforts (see Training Session Glossary)
5 (optional)	2:15 varied terrain inc some hills - Zone 1 - Zone 5	1:15 Zone 1
Total	6:15 - 7:45	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 3

Weeks 13 - 16

Week 13

Session	Outdoor	Wattbike
1	3:15 include some hills - Zone 2 - Zone 6	
2	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
3		45' Zone 1 with 2 x 4 mins Zone 4 efforts at 15' and 27'
4	Power session 2 include 4 efforts (see Training Session Glossary)	Power session 2 include 4 efforts (see Training Session Glossary)
5 (optional)	2:45 include some hills - Zone 2 - Zone 6	1:15 Zone 1
Total	8:00 - 8:30	

Week 15

Session	Outdoor	Wattbike
1	4:00 include some hills - Zone 2 - Zone 6 up to 6:00 with group	
2	45' Recovery - Zone 1	20' Zone 1
3	3:00 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 3
4	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
5 (optional)		
Total	5:50 - 8:45	

Week 14

Session	Outdoor	Wattbike
1	3:00 include some hills - Zone 2 - Zone 6	
2	45' Recovery - Zone 1	20' Zone 1
3		45' Progressive Session Zone 1 - Zone 3
4	Power session 1 include 4 efforts (see Training Session Glossary)	Power session 1 include 4 efforts (see Training Session Glossary)
5 (optional)	2:00 flat terrain Zone 1 - Zone 4	1:15 Zone 1

Week 16

Session	Outdoor	Wattbike
1	5:45 include some hills - Zone 2 - Zone 6	
2		
3	45' - 60' Recovery - Zone 2	30' Zone 1
4	1:15 flat terrain Zone 1 - Zone 4	45' Zone 2
5 (optional)		EVENT

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 4

Weeks 1 - 4

Week 1

Session	Outdoor	Wattbike
1		45' - 60' Recovery Zone
2		30' Zone 1 Focus on Pedalling Technique
3	1:30 varied terrain Zone 1 - Zone 5	60' Zone 1 - Zone 2
4		45' Progressive Session Zone 1 - Zone 3
5 (optional)		
Total	2:35 - 3:05	

Week 2

Session	Outdoor	Wattbike
1	1:30 varied terrain Zone 1 - Zone 5	60' Zone 2
2	45' - 60' Recovery - Zone 1	30' Zone 1 Focus on Pedalling Technique
3	1:30 varied terrain Zone 1 - Zone 5	60' Zone 2
4		45' Progressive Session Zone 1 - Zone 3
5 (optional)		
Total	1:50 - 2:20	

Week 3

Session	Outdoor	Wattbike
1	1:45 flat terrain Zone 1 - Zone 4	60' Zone 2
2	45' - 60' Recovery - Zone 1	30' Zone 1 Focus on Pedalling Technique
3	1:45 varied terrain Zone 1 - Zone 4	45' Zone 2
4		45' Zone 1 with 2 x 4 mins Zone 4 efforts at 15' and 27'
5 (optional)		
Total	3:00 - 5:00	

Week 4

Session	Outdoor	Wattbike
1	2:00 flat terrain Zone 1 - Zone 4	90' Zone 2
2	60' Zone 2	45' Zone 2 - Zone 3
3	1:45 flat terrain Zone 1 - Zone 4	45' Zone 2
4		45' Zone 1 with 2 x 4 mins Zone 4 efforts at 15' and 27'
5 (optional)	45' - 60' Recovery - Zone 1	30' Zone 1
Total	5:00 - 6:30	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 4

Weeks 5 - 8

Week 5

Session	Outdoor	Wattbike
1	1:45 flat terrain Zone 1 - Zone 4	60' Zone 2
2	60' Zone 2	45' Zone 2 - Zone 3
3	1:45 flat terrain Zone 1 - Zone 4	30' Cadence Session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
4		45' Progressive Session Zone 1 - Zone 3
5 (optional)	1:45 flat terrain - Zone 1 - Zone 4	45' Zone 2
Total	3:00 - 4:45	

Week 6

Session	Outdoor	Wattbike
1	2:00 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 3
2	45' - 60' Recovery Zone 2	30' Zone 1 Focus on Pedalling Technique
3	1:30 Zone 1 - Zone 5 include Strength session with 3 x 3 min efforts at 35', 43', 51' - strength effort stay in the saddle ride 2-3 sprockets higher than normal try not to pull on bars too much	Strength session with 3 efforts (see Training Session Glossary)
4	1:45 flat terrain - Zone 1 - Zone 4	45' Zone 2
5 (optional)	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	60' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
Total	4:00 - 6:30	

Week 7

Session	Outdoor	Wattbike
1	2:30 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 3
2	45' - 60' Recovery Zone 2	30' Zone 1 Focus on Pedalling Technique
3	1:30 Zone 1 - Zone 5 include Strength session with 3 x 3 min efforts at 35', 43', 51' - strength effort stay in the saddle ride 2-3 sprockets higher than normal try not to pull on bars too much	Strength session with 3 efforts (see Training Session Glossary)
4	2:00 flat terrain - Zone 1 - Zone 4	60' Zone 2 - Zone 3
5 (optional)	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	60' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
Total	4:15 - 7:15	

Week 8

Session	Outdoor	Wattbike
1	2:45 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 4
2	1:00 flat terrain - Zone 1 - Zone 4	40' Zone 2
3	1:30 Zone 1 - Zone 5 include Strength session with 3 x 3 min efforts at 35', 43', 51' - strength effort stay in the saddle ride 2-3 sprockets higher than normal try not to pull on bars too much	Strength session with 3 efforts (see Training Session Glossary)
4	2:00 flat terrain - Zone 1 - Zone 4	60' Zone 2 - Zone 3
5 (optional)	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	60' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
Total	4:25 - 7:30	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 4

Weeks 9 - 12

Week 9

Session	Outdoor	Wattbike
1	3:00 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 4
2	1:00 flat terrain - Zone 1 - Zone 4	40' Zone 2
3	1:30 Zone 1 - Zone 5 include Strength session with 3 x 3 min efforts at 35', 43', 51' - strength effort stay in the saddle ride 2-3 sprockets higher than normal try not to pull on bars too much	Strength session with 3 efforts (see Training Session Glossary)
4	2:00 flat terrain - Zone 1 - Zone 4	60' Zone 2 - Zone 3
5 (optional)	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	60' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
Total	4:25 - 7:45	

Week 11

Session	Outdoor	Wattbike
1		20' Test OR 10 mile TT
2	2:00 include some hills - Zone 2 - Zone 6	1:30 Zone 2 / Zone 3
3	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence Session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
4	2:30 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 3
5 (optional)	Power session - as WB session. On drops on road bike. Efforts on flat or slightly uphill	Power session 2 include 4 efforts (see Training Session Glossary)
Total	4:45 - 6:45	

Week 10

Session	Outdoor	Wattbike
1	3:15 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 4
2	1:00 flat terrain Zone 1 - Zone 4	45' Zone 2
3	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence Session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
4	1:15 flat terrain - Zone 1 - Zone 4	45' Zone 2
5 (optional)		

Week 12

Session	Outdoor	Wattbike
1	3:15 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 4
2	1:00 flat terrain - Zone 1 - Zone 4	40' Zone 2
3	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence Session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
4	2:30 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 3
5 (optional)	Power session - as WB session. On drops on road bike. Efforts on flat or slightly uphill	Power session 2 include 4 efforts (see Training Session Glossary)
Total	4:55 - 8:30	

Cells with a shaded background denote the suggested route through the sessions



Sportive Training Plan - Level 4

Weeks 13 - 16

Week 13

Session	Outdoor	Wattbike
1	3:30 include some hills - Zone 2 - Zone 6	1:30 Zone 2 - Zone 4
2	45' Recovery - Zone 1	20' Zone 1
3	Power session - as WB session. On drops on road bike. Efforts on flat or slightly uphill	Power session 2 include 6 efforts (see Training Session Glossary)
4		45' Progressive Session Zone 1 - Zone 5
5 (optional)	2:00 flat terrain - Zone 1 - Zone 4	60' Zone - Zone 3
Total	4:20 - 7:45	

Week 14

Session	Outdoor	Wattbike
1	4:00 include some hills - Zone 2 - Zone 6 up to 6:00 in group	1:30 Zone 2 - Zone 4
2	1:00 flat terrain - Zone 1 - Zone 4	40' Zone 2
3		20' Test OR 10 mile TT
4	1:45 include some hills - Zone 2 - Zone 6	60' Zone 2 - Zone 4
5 (optional)	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence Session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
Total	4:25 - 8:30	

Week 15

Session	Outdoor	Wattbike
1		45' Progressive Session Zone 1 - Zone 5
2	1:00 flat terrain - Zone 1 - Zone 4	40' Zone 2
3	3:15 include some hills - Zone 2 - Zone 6	
4		
5 (optional)	45' Zone 1 with 2 x 4 mins Zone 4 efforts at 15' and 27'	
Total	5:10 - 5:45	

Week 16

Session	Outdoor	Wattbike
1	2:45 include some hills - Zone 2 - Zone 6	
2		
3	45' - 60' Recovery - Zone 1	30' Zone 1
4	1:15 flat terrain - Zone 1 - Zone 4	45' Zone 2
5 (optional)	EVENT	
Total	5:00	



Sportive Training Plan - Level 5

Weeks 1 - 4

Week 1

Session	Outdoor	Wattbike
1		3' OR 20' Test
2	3:00 flat terrain Zone 1 - Zone 4	30' Zone 1 Focus on Pedalling Technique
3	1:30 Zone 3	60' Zone 3 - Zone 4
4	60' Cadence session Zone 1 - Zone 4 include 4' rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4' rev outs' on lowest resistance setting
5	2:00 flat terrain Zone 1 - Zone 4	60' Zone 3
6		
Total	4:30 - 7:30	

Week 2

Session	Outdoor	Wattbike
1	3:00 varied terrain Zone 1 - Zone 5	1:30 Zone 2 - Zone 4
2	60' Cadence session Zone 1 - Zone 4 include 4' rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4' rev outs' on lowest resistance setting
3	1:30 Zone 3	60' Zone 3 - Zone 4
4	4:00 flat terrain Zone 1 - Zone 5	1:30 Zone 2 - Zone 4
5	2:00 flat terrain Zone 1 - Zone 4	60' Zone 3
6		
Total	5:30 - 11:50	

Week 3

Session	Outdoor	Wattbike
1	3:00 Hilly Zone 1 - Zone 6	1:30 Zone 2 - Zone 5
2	60' Cadence session Zone 1 - Zone 4 include 4' rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4' rev outs' on lowest resistance setting
3	1:45 Zone 2 - Zone 3	60' Zone 3 - Zone 4
4	4:00 varied terrain Zone 1 - Zone 5	1:30 Zone 2 - Zone 4
5	2:30 flat terrain Zone 1 - Zone 4	1:30 Zone 2 - Zone 4
6		
Total	6:00 - 12:15	

Week 3

Session	Outdoor	Wattbike
1	3:00 Hilly Zone 1 - Zone 6	1:30 Zone 2 - Zone 5
2	60' Cadence session Zone 1 - Zone 4 include 4' rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4' rev outs' on lowest resistance setting
3	2:00 Varied terrain Zone 1 - Zone 5	60' Zone 3 - Zone 4
4	4:00 flat terrain Zone 1 - Zone 4 up to 6:00 with group	1:30 Zone 2 - Zone 3
5	2:45 flat terrain Zone 1 - Zone 4	1:30 Zone 2 - Zone 4
6		
Total	6:00 - 13:15	



Sportive Training Plan - Level 5

Weeks 5 - 8

Week 5

Session	Outdoor	Wattbike
1	3:30 Hilly Zone 1 - Zone 6	1:30 Zone 2 - Zone 5
2	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
3	1:30 Zone 1 - Zone 5 include Strength session with 3 x 3 min efforts at 35', 43', 51' - strength effort stay in the saddle ride 2-3 sprockets higher than normal try not to pull on bars too much	Strength session with 3 efforts (see Training Session Glossary)
4	4:00 flat terrain Zone 1 - Zone 4 up to 6:00 with group	1:30 Zone 2 - Zone 3
5		
6		
Total	6:00 - 13:15	

Week 7

Session	Outdoor	Wattbike
1	3:45 Hilly Zone 1 - Zone 6	1:30 Zone 2 - Zone 5
2	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
3	1:30 Zone 1 - Zone 5 include Strength session - 2 sets of 3 x 3 min efforts at 24', 32', 40' and 50', 58', 66' - strength effort stay in the saddle ride 2-3 sprockets higher than normal try not to pull on bars too much	Strength session with 3 efforts (see Training Session Glossary)
4	4:00 flat terrain Zone 1 - Zone 4 up to 6:00 with group	1:30 Zone 2 - Zone 3
5	1:30 Zone 1 - Zone 6 Strength Session with 3 climbs between 2 - 3 mins ride 3 hills out of saddle over geared cadence 40-60	
6		
Total	6:15 - 12:15	

Week 6

Session	Outdoor	Wattbike
1	3:30 Hilly Zone 1 - Zone 6	1:30 Zone 2 - Zone 5
2	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
3	1:30 Zone 1 - Zone 5 include Strength session with 2 x 3 min efforts at 29', 37' and 47', 55' - strength effort stay in the saddle ride 2-3 sprockets higher than normal try not to pull on bars too much	Strength session with 3 efforts (see Training Session Glossary)
4	4:00 flat terrain Zone 1 - Zone 4 up to 6:00 with group	1:30 Zone 2 - Zone 3
5	1:30 Zone 1 - Zone 6 Strength Session with 3 climbs between 2 - 3 mins ride 3 hills out of saddle over geared cadence 40-60	
6		
Total	5:45 - 11:30	

Week 8

Session	Outdoor	Wattbike
1	3:45 Hilly Zone 1 - Zone 6	1:30 Zone 2 - Zone 5
2	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
3	1:30 Zone 1 - Zone 5 include Strength session - 2 sets of 3 x 3 min efforts at 24', 32', 40' and 50', 58', 66' - strength effort stay in the saddle ride 2-3 sprockets higher than normal try not to pull on bars too much	Strength session with 3 efforts (see Training Session Glossary)
4	4:00 flat terrain Zone 1 - Zone 4 up to 6:00 with group	1:30 Zone 2 - Zone 3
5	2:00 Zone 1 - Zone 6 Strength Session with 3 climbs between 2 - 3 mins ride 3 hills out of saddle over geared cadence 40-60	
6	2:00 flat terrain Zone 1 - Zone 4	
Total	6:15 - 14:30	



Sportive Training Plan - Level 5

Weeks 9 - 12

Week 9

Session	Outdoor	Wattbike
1	2:00 flat terrain Zone 1 - Zone 4	1:00 Zone 2
2		30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
3	2:00 flat terrain Zone 1 - Zone 4	60' Zone 3
4		
5		
6		
Total	2:30 - 4:30	

Week 10

Session	Outdoor	Wattbike
1		3' OR 20' Test
2	3:30 Hilly Zone 1 - Zone 6	1:30 Zone 2 - Zone 5
3	Power session - as WB session. On drops on road bike. Efforts on flat or slightly uphill	Power session 1 with 4 efforts (see Training Session Glossary)
4	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
5		Power session 2 with 4 intervals (see Training Session Glossary)
6	2:00 flat terrain Zone 1 - Zone 4	60' Zone 3
Total	6:00 - 9:15	

Week 11

Session	Outdoor	Wattbike
1	3:30 Hilly Zone 1 - Zone 6	1:30 Zone 2 - Zone 5
2	Recovery ride - 60' Zone 1, high cadence 90+	30' Zone 1, Cadence 90+
3	Power session - as WB session. On drops on road bike. Efforts on flat or slightly uphill	Power session 1 with 4 efforts (see Training Session Glossary)
4	4:00 flat terrain Zone 1 - Zone 4 up to 6:00 with group	1:30 Zone 2 - Zone 4
5	10 mile TT at Zone 5 - AT	10 mile TT at Zone 5 - AT
6	2:00 flat terrain Zone 1 - Zone 4	60' Zone 3
Total	6:00 - 12:30	

Week 12

Session	Outdoor	Wattbike
1	3:30 Hilly Zone 1 - Zone 6	1:30 Zone 2 - Zone 5
2	Recovery ride - 60' Zone 1, high cadence 90+	30' Zone 1, Cadence 90+
3	Power session - as WB session. On drops on road bike. Efforts on flat or slightly uphill	Power session 1 with 4 efforts (see Training Session Glossary)
4	4:00 flat terrain Zone 1 - Zone 4 up to 6:00 with group	1:30 Zone 2 - Zone 4
5		Power session 2 with 6 intervals (see Training Session Glossary)
6	2:00 flat terrain Zone 1 - Zone 4	60' Zone 3
Total	6:00 - 12:30	



Sportive Training Plan - Level 5

Weeks 13 - 16

Week 13

Session	Outdoor	Wattbike
1	60' Zone 1 - Zone 2	40 mins L2
2		
3	4:00 Varied terrain Zone 1 - Zone 4	1:30 Zone 2 - Zone 3
4	60' Cadence session Zone 1 - Zone 4 include 4 'rev outs' downhill (downhill sprints)	30' Cadence session Zone 1 - Zone 2 include 4 'rev outs' on lowest resistance setting
5	2:00 flat terrain Zone 1 - Zone 4	60' Zone 3
6	10 mile TT at Zone 5 - AT	10 mile TT at Zone 5 - AT
Total	5:30 - 10:00	

Week 14

Session	Outdoor	Wattbike
1	4:00 Varied terrain Zone 1 - Zone 5	1:30 Zone 2 - Zone 4
2	Recovery ride - 60' Zone 1, high cadence 90+	30' Zone 1, Cadence 90+
3		Zone 5 - AT Session 1 with 4 efforts (see Training Session Glossary)
4	2:00 flat terrain Zone 1 - Zone 4	60' Zone 3
5		Zone 5 - AT Session 2 with 3 efforts (see Training Session Glossary)
6	Recovery ride - 60' Zone 1, high cadence 90+	30' Zone 1, Cadence 90+
Total	5:00 - 9:30	

Week 15

Session	Outdoor	Wattbike
1	4:00 Varied terrain Zone 1 - Zone 5	1:30 Zone 2 - Zone 4
2	Recovery ride - 60' Zone 1, high cadence 90+	30' Zone 1, Cadence 90+
3		Zone 5 - AT Session 2 with 3 efforts (see Training Session Glossary)
4	Recovery ride - 60' Zone 1, high cadence 90+	30' Zone 1, Cadence 90+
5	10 mile TT at Zone 5 - AT	10 mile TT at Zone 5 - AT
6		
Total	4:30 - 7:45	

Week 16

Session	Outdoor	Wattbike
1	2:30 flat terrain Zone 1 - Zone 4	1:30 Zone 2 - Zone 4
2	Recovery ride - 60' Zone 1, high cadence 90+	30' Zone 1, Cadence 90+
3	3:00 Varied terrain Zone 1 - Zone 5	60' Zone 2
4	EVENT	
5		
6		
Total	06:30	



The Triathlon Winter Plan



Contents

The Triathlon Winter Plan	125
Flat Terrain	126
Varied Terrain.....	126
Triathlon Plan	128
Using a Wattbike Pro.....	128
Week 3 Example	128
Winter Training Plan Technique Sessions	130
Technique Session Weeks 2-5 - Resistance Level 1	131
Technique Session Weeks 7-10 - Resistance Level 2	132
Technique Session Weeks 12-15 - Resistance Level 3	134
Triathlete Winter Training Plans.....	135



The Triathlon 16 Week Training Plan

This Plan is designed for experienced triathletes and cyclists using a Wattbike Pro, although by using the table on page 9 it can be adapted for the Wattbike Trainer. It can be followed as a complete 16 week training plan if time is limited or if it is difficult to get out on the road due to darkness or inclement weather.

Training on the Wattbike is time efficient and has the advantage of monitoring everything that you do from pedalling technique to physiological response (heart rate) and power output (Watts).

A general cadence Guide for each of the Training Zones is:

- Recovery - 60-80 rpm
- Zone 1 – 80-85 rpm
- Zone 2 – 85-90 rpm
- Zone 3 – 90-95 rpm
- Zone 4 – 95-100 rpm
- Zone 5 – 95-105 rpm
- Zone 6 – 95-110 rpm
- Maximal 100 + rpm

The simplest way to start is to undertake either a 3' aerobic test or a ramp test to determine your maximum minute power and maximum heart rate and to calculate your heart rate and power training Zones.

The Triathlon 16 Week Training Plan is designed to take you through the winter training months from October through to January or November through to February. The Plan is general and not an individual plan but has a structure that is useful to follow in the absence of any other plan.

The Plan consists of 4 sessions a week – 2 X 'long' slow Zone 1 to Zone 2 rides, 1 technique session and a medium length interval session (2 x 20' 5' rest between intervals Zone 2 and Zone 3).

After the initial Set up and familiarization week there are 3 X 5 week periodised phases with periodisation within each phase.

Week 1 is a Test, Set up and Wattbike familiarization week.

Weeks 6, 11 are recovery weeks and Week 16 is recovery and re-test week ready for the next Plan in the series.

The recovery weeks include a 10' submaximal progress check.

In weeks 4, 9 and 14 there is a high intensity (Zone 5) 20' progress Test.



Wherever possible (weather permitting) one of either session 1 or 4 should be a road ride. Try not to miss this session.

The 'long' road and Wattbike rides are aimed at general conditioning and to build endurance which is an important requirement for completing a triathlon or long cycling event. Long road rides can be a longer duration than indicated but on a Wattbike the maximum duration should be 90'.

During all road and Wattbike rides, it is important to eat and drink throughout – so always have food with you and aim to drink a 500ml bottle every 1 – 1.5 hrs. You should finish this ride feeling relaxed and not too tired. Whilst these sessions are specified as Zone 1 to Zone 2 it is accepted, on road rides that due to terrain your heart rate may stray into higher Zones but the bulk of the ride should be at Zone 1 to Zone 2.

Where possible complete your long road ride of each week in a group. This will help develop your group riding skills and also enable a longer distance to be covered for the same amount of effort of a shorter ride.

Road rides are notated to be carried out on either flat or varied terrain. The ability for you to include the rides as detailed will be somewhat determined by the area that you live / ride. However, where if possible, use the below to guide you to build the routes:

Flat Terrain:

80% flat. You would be able to ride 80% of the route sitting in the saddle and using just 3 or 4 different gears.

Varied Terrain:

Rolling terrain, not too structured, avoid really big hills. Let the terrain dictate the Zones whilst riding 'steady' and not attacking the hills. Ride easy on the flat sections.

The 'long' Wattbike rides can be split into intervals if needed (for comfort) so for instance a 90' session can become 2 x 45' or 3 x 30' or 4 x 22.4' (2' rest between intervals).

The Plan recovery weeks should be treated as compulsory. Do not hesitate to take extra recovery days throughout the duration of the Plan.

Do not overreach, take a sensible approach to the Plan to avoid over training, fatigue, illness and injury.

The winter months are well known for viral infections from mild colds through to flu and other viruses. NEVER train when ill, wait until you are fully recovered before recommencing training – always start training again at low intensity and progressively build back into the Winter Training Plan.



Warning

The training plans in this Guide assume a basic to high level of fitness and should not be attempted if you are a beginner or have been recently ill or injured (use the estimated methods). If in doubt consult your Doctor before you commence a Wattbike test or training plan. The tests are not suitable for children or young adults under the age of 18 unless under supervision.



Triathlon Plan

Using a Wattbike Pro

Note: any combination of resistance level and cadence is acceptable to suit riding style and aim of a specific training session. See the table of resistance setting, cadence and power (see page 9)

Test Results

3' Test 90-110 cadence - 340 W (resistance level 5 at 100 cadence), MaxHR 188

Heart rate and Power Training Zones

	HR	Power [W]*
Recovery	<113	<119
Zone 1 Basic	122-141	119-153
Zone 2 Basic	122-141	153-187
Zone 3 Intensive	141-154	187-221
Zone 4 Intensive	154-167	221-255
Zone 5 Maximal	167-177	255-289
Zone 6 Maximal	> 177	289-340
Supra-maximal	N/A	> 340

*For training sessions and ease of monitoring round all power outputs (W) to nearest 5 W
All sessions on a Wattbike Pro

Week 3 Example

1. 60' Z1-Z2

	Description
Warm up	5-10 mins @ recovery Zone HR <133 + Power <119W Resistance level 1 <80 rpm
Workout	60' riding with HR in the range 113 to 141 and power range 119-187. Suggest 20' at Z1 HR 117, power 136 W resistance level 1 at 85 cadence, 20' HR 132, power 170 W resistance level 2 at 90 cadence, 20' Z1 HR 117, power 136 W resistance level 1 at 85 cadence
Cool down	5-10 mins @ recovery Zone HR <113 + Power <119W

2. 4 x 5' intervals 1 minute rest between intervals

	Description
Warm up	20 mins Resistance level 1 90-110 rpm
Workout	Session at resistance level 1 Interval 1 90 rpm @ 150 W Interval 2 95 rpm @ 175 W Interval 3 100rpm @ 190 W Interval 4 105 rpm @ 210 W HR in range 113-141
Cool down	15-20 mins @ recovery Zone HR <113 + Power <119W Resistance level 1 <80 rpm

3. 2 x 20' Z3 5' rest between intervals

	Description
Warm up	10 mins progressive Recovery-Z1-Z2 Zones HR to 141 max + Power to 187 max Resistance level 1 cadence <80 through to 100
Workout	2 x 20' intervals (5 minutes rest between intervals) HR in the 141-154 range and power 187-221. Mean 147 HR, power 204 – resistance level 2/3 at 90-100
Cool down	10 mins @ recovery Zone HR <113 + Power <119W Resistance level 1 <80 rpm

4. 60' Z1-Z2

	Description
Warm up	5-10 mins @ recovery Zone HR <113 + Power <119W Resistance level 1 <80 rpm
Workout	60' riding with HR in the range 113 to 141 and power range 119-187. Resistance level 1 at 90 cadence Suggest 20' at Z1 HR 117, power 136 W resistance level 1 at 85 cadence, 20' HR 132, power 170 W resistance level 2 at 90 cadence, 20' Z1 HR 117, power 136 W resistance level 1 at 85 cadence
Cool down	5-10 mins @ recovery Zone HR <113 + Power <119W

The 20' Test in weeks 4, 9 & 14 would be done at 75-80% of MMP i.e. $340 \times 0.8 = 272W$



16 Week Training Plan Technique Sessions

Make sure you fully understand the pedalling technique section of the main Training Guide. Selection of the correct resistance and cadence level for the technique sessions is important. Use your maximum minute power (MMP) assigned to the 20' warm up routine to identify a suitable cadence range.

If MMP is below 280 W restrict the technique sessions to resistance levels 1 and 2 on a Wattbike Pro

- MMP below 280 W use 80 as starting cadence
- MMP below 300 W use 85 as starting cadence
- MMP above 320 W use 90 as starting cadence

As a general guide technique sessions should be completed in heart rate and power training Zones 1 and 2 and occasionally into Zone 3 during the last interval of weeks 12 to 15 – adjust cadence to keep within these Zones.

Although the sessions are specified in 5 rpm increases per interval the progression can be a lower rpm increase if needed e.g. 3 or 4 rpm. Be flexible, the essence of the technique sessions is to maintain pedalling technique whilst increasing leg speed for each interval within training Zones Z1-Z2 and occasionally into Z3.

Cyclists with MMP above 320 may be more flexible on the choice of resistance level and cadence subject to the heart rate and power training Zone limit and the ability to maintain a good pedalling action. Practicing good technique at the lower resistance levels is a good discipline to adopt.

On a Wattbike Pro the technique session will be undertaken at resistance level 1 in Phase 1, resistance level 2 in phase 2 and resistance level 3 in Phase 3.

The following table shows the relationship between cadence and watts at resistance levels 1 – 3 in the cadence range 80-110. For other cadences and resistance levels see the Power, Resistance and Cadence Table (page 9).



Wattbike Pro

rpm	Resistance Level 1	Resistance Level 2	Resistance Level 3
80	115	125	145
85	130	145	165
90	150	165	200
95	175	190	225
100	190	215	260
105	210	240	295
110	240	280	340

The technique sessions for each week of the plan - all based on a Wattbike Pro

Technique session Weeks 2-5 – Resistance level 1

Week 2

	Description
Warm up	20 mins 5 x 4' intervals 1 minute rest between intervals
Workout	Interval 1 80rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90rpm (95, 100) Interval 4 95rpm (100, 105) Interval 5 100rpm (105, 110)
Cool down	20 mins @ recovery Zone

Week 3

	Description
Warm up	20 mins 5 x 4' intervals 1 minute rest between intervals
Workout	Interval 1 80rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90rpm (95, 100) Interval 4 95rpm (100, 105)
Cool down	20 mins @ recovery Zone



Week 4

	Description
Warm up	20 mins 3 x 6' intervals 1 minute rest between intervals
Workout	Interval 1 80 rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90 rpm (95, 100)
Cool down	20 mins @ recovery Zone

Week 5

	Description
Warm up	20 mins 5 x 4' intervals 1 minute rest between intervals
Workout	Interval 1 80 rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90 rpm (95, 100) Interval 4 95 rpm (100, 105) Interval 5 100 rpm (105, 110)
Cool down	20 mins @ recovery Zone

HR to remain in Z1-Z2 (Z3)

Technique session Weeks 7-10 – Resistance level 2

Week 7

	Description
Warm up	20 mins 5 x 4' intervals 1 minute rest between intervals
Workout	Interval 1 80 rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90 rpm (95, 100) Interval 4 95 rpm (100, 105)
Cool down	20 mins @ recovery Zone

Week 8

	Description
Warm up	20 mins 3 x 6' intervals 1 minute rest between intervals
Workout	Interval 1 80 rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90 rpm (95, 100)
Cool down	20 mins @ recovery Zone

Week 9

	Description
Warm up	20 mins 3 x 7' intervals 1 minute rest between intervals
Workout	Interval 1 80 rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90 rpm (95, 100)
Cool down	20 mins @ recovery Zone

Week 10

	Description
Warm up	20 mins 4 x 5' intervals 1 minute rest between intervals
Workout	Interval 1 80 rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90 rpm (95, 100) Interval 4 95 rpm (100, 105)
Cool down	20 mins @ recovery Zone

HR to remain in Z1-Z2 (Z3)



Technique session Weeks 12-15 – Resistance level 3

Week 12

	Description
Warm up	20 mins 3 x 6' intervals 1 minute rest between intervals
Workout	Interval 1 80 rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90 rpm (95, 100)
Cool down	20 mins @ recovery Zone

Week 13

	Description
Warm up	20 mins 3 x 7' intervals 1 minute rest between intervals
Workout	Interval 1 80 rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90 rpm (95, 100)
Cool down	20 mins @ recovery Zone

Week 14

	Description
Warm up	20 mins 2 x 10' intervals 2 minute rest between intervals
Workout	Interval 1 80 rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90 rpm (95, 100)
Cool down	20 mins @ recovery Zone

Week 15

	Description
Warm up	20 mins 3 x 6' intervals 1 minute rest between intervals
Workout	Interval 1 80 rpm (85, 90) Interval 2 85 rpm (90, 95) Interval 3 90 rpm (95, 100)
Cool down	20 mins @ recovery Zone

HR to remain in Z1-Z3



Triathlete 16 Week Training Plans

Note: any combination of resistance level and cadence is acceptable to suit riding style and aim of a specific training session. See the table of resistance setting, cadence and power (page 9)

Week	Session 1		Session 2	Session 3	Session 4	
	Road	Wattbike	Wattbike	Wattbike	Wattbike	Road
1 Test & Set up		3'TEST*	30' Recovery- Zone1	45' Recovery- Zone1	30' Recovery- Zone1	
Phase 1						
2	90' Zone 1 - Zone 2	45' Zone 1 - Zone 2	Technique Session	2 x 20' Zone 2 - Zone 3	45' Zone 1 - Zone 2	90' Zone 1 - Zone 2
3	120' Zone 1 - Zone 2	60' Zone 1 - Zone 2	Technique Session	2 x 20' Zone 3	60' Zone 1 - Zone 2	120' Zone 1 - Zone 2
4	150' Zone 1 - Zone 2	75' Zone 1 - Zone 2	Technique Session	Fletcher 20' TEST (Zone 5)*	75' Zone 1 - Zone 2	150' Zone 1 - Zone 2
5	90' Zone 1 - Zone 2	45' Zone 1 - Zone 2	Technique Session	2 x 20' Zone 2 - Zone 3	45' Zone 1 - Zone 2	90' Zone 1 - Zone 2
6 Recovery Week	60' Zone	30' Zone 1	45' Recovery	30' Zone 1	10' Progress Check	
Phase 2						
7	90-120' Zone 1 - Zone 2	45'-60' Zone 1 - Zone 2	Technique Session	2 x 20' Zone 2 - Zone 3	45'-60' Zone 1 - Zone 2	90-120' Zone 1 - Zone 2
8	120-150' Zone 1 - Zone 2	60'-75' Zone 1 - Zone 2	Technique Session	2 x 20' Zone 3	60'-75' Zone 1 - Zone 2	120-150' Zone 1 - Zone 2
9	150-180' Zone 1 - Zone 2	75'-90' Zone 1 - Zone 2	Technique Session	Fletcher 20' TEST (Zone 5)*	75'-90' Zone 1 - Zone 2	150-180' Zone 1 - Zone 2
10	90-120' Zone 1 - Zone 2	45'-60' Zone 1 - Zone 2	Technique Session	2 x 20' Zone 2 - Zone 3	45'-60' Zone 1 - Zone 2	90-120' Zone 1 - Zone 2
11 Recovery Week	60' Zone 1 - Zone 2	30' Zone 1	45' Recovery	30' Zone 1	10' Progress Check	
Phase 3						
12	90' Zone 1 - Zone 2	45' Zone 1 - Zone 2	Technique Session	2 x 20' Zone 2 - Zone 3	45' Zone 1 - Zone 2	90' Zone 1 - Zone 2
13	120' Zone 1 - Zone 2	60' Zone 1 - Zone 2	Technique Session	2 x 20' Zone 3	60' Zone 1 - Zone 2	120' Zone 1 - Zone 2
14	150' Zone 1 - Zone 2	75' Zone 1 - Zone 2	Technique Session	Fletcher 20' TEST (Zone 5)*	75' Zone 1 - Zone 2	150' Zone 1 - Zone 2
15	90' Zone 1 - Zone 2	45' Zone 1 - Zone 2	Technique Session	2 x 20' Zone 2 - Zone 3	45' Zone 1 - Zone 2	90' Zone 1 - Zone 2
16 Recovery & Re-Test	60' Zone 1 - Zone 2	30' Zone 1	45' Recovery	30' Zone 1	3'TEST*	

* The 20 minute warm up should be done before each of the tests



Weather permitting one of either session 1 or 4 should be a road ride (unless shown as a Test or Progress Check). The session should, wherever possible be a flat/varied terrain recovery ride.

Wattbike sessions 1 & 4 – these sessions can be split into intervals (2 minute rest) i.e.

$45' = 2 \times 22.5' \text{ or } 3 \times 15'$

$60' = 2 \times 30' \text{ or } 3 \times 20' \text{ or } 4 \times 15'$

$75' = 2 \times 37.5' \text{ or } 3 \times 25'$

$90' = 2 \times 45' \text{ or } 3 \times 30' \text{ or } 4 \times 22.4'$

Rest Interval for session 3 = 5'



Weight Management Training Plan

Contents

Introduction	138
Outline of the Wattbike Weight Management Training plan	139
Returning to training after a break	139
How to establish your heart rate and power training zones.....	140
Warm up and cool down	143
Power, resistance and cadence tables	144
Fluid and carbohydrate intake before, during and after training.....	145



Introduction

The Wattbike Weight Management Training Plan is designed for sedentary individuals although it is a plan that can be used by anyone wanting to lose weight or reduce body fat and improve overall fitness. This Training Plan is designed to be used in conjunction with a controlled diet as exercise on its own is less effective.

In addition to eating a balanced diet we also recommend supplementing your Wattbike training with other exercise activities such as a weights programme and other cardiovascular activity.

Before commencing the Wattbike Weight Management Training Plan you should consult your Doctor, and should not start the plan if you have recently been ill or injured. This Training Plan is not suitable for anyone under the age of 18 unless under supervision.

Before commencing your training plan you should ensure that you read the following sections of the Wattbike Training Guide to ensure that you are setup correctly on the Wattbike and that you are able to get the most out of your training:

- Introduction
- Wattbike specific set up
- Getting started (full section)
- 3 minute Aerobic Test

We also recommend that you make sure you understand all the functions of the Wattbike Performance Computer and how to use Wattbike Expert software to monitor and analyse your Wattbike sessions. You should thoroughly read the Wattbike User Guide that came with your Wattbike and the Beginners Guide to Wattbike Expert Software http://wattbike.com/uk/wattbike/expert_software



Outline of the Wattbike Weight Management Training plan

The Wattbike Weight Management Training Plan runs over a period of 24 weeks (6 x 4 week phases). Each four week phase consists of a light week, medium week, hard week and another light week. The intensity of the weeks are defined by the number of weekly workouts, the duration of each workout (in minutes) and by intensity (by heart rate and power training zone and cadence [revolutions per minute]) of the workouts.

Each four week phase has gradual increase in the number of workouts and the duration and intensity of each workout.

Week 1 has only 80 minutes of training at low intensity but by Week 23 there is 245 minutes of training over 5 workouts plus increases in overall intensity (Note the times given exclude warm up and cool down time, which is very important and should not be skipped).

Every workout has a pedaling technique element and a defined resistance level/cadence/heart rate and power output relative to individual ability as determined by an initial Wattbike test.

Recovery is important – if you feel you need more time to recover, extra rest days during any week are acceptable and after every four week phase you may want to rest for two to three days before starting the next phase.

Stop training at once if ill or injured and do not recommence until fully recovered.

Returning to training after a break

If you have missed between less than 5 workouts pick up the plan from where you left off.

If you have missed 5-10 workouts go back to the first week of the four week phase you had started. If you have missed 10-20 workouts go back one, four week phase

If you miss more than 20 workouts you may want to start the plan from the beginning

If you have been ill or injured for a prolonged period you should go back to the start of the training plan.

After a holiday two to three days at Recovery level should be sufficient to get back into the Training Plan at the pre holiday level.



How to establish your heart rate and power training zones

The Wattbike Weight Management Training Plan sets a training intensity range of < 60% up to 75% of maximum heart rate (MHR) for this training plan which is equivalent to heart rate and power training zones Recovery through to Zone 2 (see the Wattbike Training Guide wattbike.com/uk/guide).

You should feel relaxed and able to carry on a conversation in training zones Recovery/Zone 1 and in Zone 2 you should feel as though you are working harder, feeling warmer with heart rate and respiration increased and you may start to sweat.

The purposes of these three training zones are:

Recovery

Regeneration and recovery – increases blood flow to muscles to flush out waste products and provide nutrients, allows you to work on technique

Zone 1

Establish base endurance – Improves fat metabolism, gets muscles, tendons, ligaments and nerves used to cycling, more efficient use of energy, allows you to work on technique

Zone 2

Improve efficiency – Improves the ability to use oxygen and produce power (efficiency = able to produce more power with the same level of effort), allows you to work on technique

Together with the heart rate percentage the training plan also uses maximum minute power (MMP)* to determine both the power element of the zones and warm up level.

*The highest average minute power output (in Watts) achieved during a Wattbike cycling ramp test (usually the final minute)

The only way to determine your cycling maximum heart rate and maximum minute power is by using a properly constructed cycling test.

Warning:

Cycling tests require considerable motivation, physical stress and discomfort and it is inadvisable without medical clearance and supervision, particularly for individuals predisposed to coronary heart disease.

As this is a weight management training plan the maximum heart rate ramp tests outlined in the Wattbike Training Guide are not recommended in the initial stages of the Wattbike Weight Management Training Plan.



We therefore suggest that people consider themselves 'average' and use age predicted maximum heart rates despite the inaccuracy of such methods (which can be as much as +/- 20 bpm).

Remember that if you know your running maximum heart rate your cycling max could be 5-10 beats lower.

A number of methods of estimating your MHR are available:

1. $MHR = 220 - \text{your age} - 5^*$ OR
2. $MHR = 210 - (0.65 \times \text{age}) - 5^*$ OR
3. $MHR = 217 - (0.85 \times \text{age}) - 5^*$

* Note – an additional 5 beats have been removed to account for the traditional calculations being designed for running and not cycling.

As you progress in your training adjust your training zones if you achieve a higher maximum heart rate and, when fit enough arrange to undertake a structured Wattbike cycling test.

To estimate maximum minute power use the average power achieved in a Wattbike 3 minute aerobic test (see the Wattbike Training Guide [LINK HERE](#)). Exercise caution when undertaking the test for the first time. You can also use the maximum heart rate achieved in this test as your starting point for heart rate calculations .

Always err on the side of caution, as your fitness improves you can adjust the heart rate and power training zones.

Example (Wattbike Trainer):

Participant Age: 40

$MHR = 220 - \text{age} - 5 = 220 - 40 - 5 = 175$

Estimated MHR = 175

3 minute aerobic test result = 280 W

Training zones:

Zone	%MHR	HR range	%MMP	Power (W)	Cadence rpm	*Air resistance
Recovery	<60	<105	<35	<98	<80	4
Zone 1	60-65	105-114	35-45	98-126	80-85	5
Zone 2	65-75	114-131	45-55	126-154	85-90	5

* On a Wattbike Trainer



Example (Wattbike Pro):

Participant Age: 40

MHR = $220 - \text{age} - 5 = 220 - 40 - 5 = 175$

Estimated MHR = 175

3 minute aerobic test result = 340 W

Training zones:

Zone	%MHR	HR range	%MMP	Power (W)	Cadence rpm	*Air resistance
Recovery	<60	<105	<35	<119	<80	1
Zone 1	60-65	105-114	35-45	119-153	80-85	2
Zone 2	65-75	114-131	45-55	153-187	85-90	3



Warm up and cool down

Warm up and cool down are an integral part of a workout and should not be missed. For a full explanation of warm up and cool down see the Wattbike Training Guide

wattbike.com/uk/guide

Recommended warm up and cool down for the workouts are:

Recovery

Warm up and cool down 5' easy pedalling (below 80 rpm) at level 1 on the Wattbike Pro and lower than level 5 on the Wattbike Trainer

Zone 1

Warm up and cool down 5'-10' easy pedalling (below 80 rpm) at level 1 on the Wattbike Pro and lower than level 5 on the Wattbike Trainer

Zone 2

Warm up

10' duration

1' @ 80

1' @ 85

1' @ 90

1' @ 95

1' @ 100

1' @ 80

6" rev out

54" @ 85-90

6" rev out

54" @ 85-90

2' @ 80

The Zone 2 warm up resistance level setting is based on your maximum minute power established in your 3 minute aerobic test – see the Wattbike Training Guide for full warm up details.

Cool down 5'-10' easy pedalling (below 80 rpm) at level 1 on the Wattbike Pro and lower than level 5 on the Wattbike Trainer.



Power, resistance and cadence tables

The full tables can be found in the Wattbike Training Guide wattbike.com/uk/guide. The tables below show the approximate power output in Watts for each air resistance level in the 80-90 cadence range.

Wattbike Pro

Cadence	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10
80	115	125	150	170	195	215	235	250	270	280
85	130	145	170	195	225	260	275	295	320	340
90	150	165	200	235	265	300	325	350	375	390

Wattbike Trainer

Cadence	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10
80	65	70	85	95	110	125	135	145	155	160
85	75	80	100	115	130	145	160	170	180	190
90	85	95	115	135	150	170	185	200	215	225

Fluid and carbohydrate intake before, during and after training

When training on an indoor cycle careful attention to fluid and carbohydrate intake is required. Try to train in an air conditioned area or an area with good natural air circulation. A fan may help – keeping cool is important – see the section in the Wattbike Training Guide. Be careful about consuming many of the energy drinks that are available, many are calorie rich and contain sugar which will add weight rather than reducing it. The idea behind this plan is to assist with burning calories. Whilst correct hydration is vital this can be achieved during the workouts simply by drinking water before during and after your workout. Sensible eating before and after your workout will help to ensure you have sufficient energy for the workout whilst helping weigh/fat loss.



Weight Management Training Plan

Weeks 1 - 4

Week	Workout PHASE 1	1	2	3	4	5
1		20' Recovery	20' Zone 1	20' Recovery	20' Zone 1	
2		25' Zone 1	25' Recovery	25' Zone 1	20' Recovery	
3		25' Recovery	25' Zone 1	25' Zone 1	25' Recovery	
4		20' Recovery	20' Zone 1	20' Recovery	20' Zone 1	20' Recovery

Weeks 9 - 12

Week	Workout PHASE 3	1	2	3	4	5
9		30' Recovery	30' Zone 2	30' Recovery	25' Zone 2	30' Zone 1
10		35' Zone 1	30' Recovery	35' Zone 2	30' Recovery	30' Zone 1
11		35' Recovery	35' Zone 2	35' Zone 2	35' Recovery	
12		30' Recovery	30' Zone 2	30' Recovery	25' Zone 2	30' Zone 1

Weeks 17 - 20

Week	Workout PHASE 5	1	2	3	4	5
17		40' Recovery 2 x 20' - 4'R	40' Zone 2 2 x 20' - 4'R	40' Recovery 2 x 20' - 4'R	35' Zone 2	40' Zone 1 2 x 20' - 4'R
18		45' Zone 2 2 x 22.5' - 4'R	40' Recovery	45' Zone 2 2 x 22.5' - 4'R	45' Recovery 2 x 22.5' - 4'R	40' Zone 2
19		45' Recovery 2 x 22.5' - 4'R	45' Zone 2 2 x 22.5' - 4'R	45' Zone 2 2 x 22.5' - 4'R	45' Zone 1 2 x 22.5' - 4'R	40' Zone 2 2 x 20' - 4'R
20		40' Recovery 2 x 20' - 4'R	40' Zone 2 2 x 20' - 4'R	40' Recovery 2 x 20' - 4'R	35' Zone 2	40' Zone 1 2 x 20' - 4'R

Weeks 5 - 8

Week	Workout PHASE 2	1	2	3	4	5
5		25' Recovery	25' Zone 1	25' Recovery	25' Zone 2	25' Recovery
6		30' Zone 1	25' Recovery	30' Zone 2	25' Recovery	
7		30' Recovery	30' Zone 2	30' Zone 1	30' Recovery	
8		25' Recovery	25' Zone 1	25' Recovery	25' Zone 2	25' Recovery

Weeks 13 - 16

Week	Workout PHASE 4	1	2	3	4	5
13		35' Recovery	35' Zone 2	35' Recovery	30' Zone 2	35' Zone 1
14		40' Zone 2 2 x 20' - 4'R	35' Recovery	40' Zone 2 2 x 20' - 4'R	35' Recovery	35' Zone 1
15		40' Recovery 2 x 20' - 4'R	40' Zone 2 2 x 20' - 4'R	40' Zone 2 2 x 20' - 4'R	40' Recovery 2 x 20' - 4'R	35' Zone 2
16		35' Recovery	35' Zone 2	35' Recovery	30' Zone 2	35' Zone 1

Weeks 21 - 24

Week	Workout PHASE 6	1	2	3	4	5
21		45' Recovery 2 x 22.5' - 4'R	45' Zone 2 2 x 22.5' - 4'R	45' Recovery 2 x 22.5' - 4'R	40' Zone 2	45' Zone 1 2 x 22.5' - 4'R
22		50' Zone 2 2 x 25' - 4'R	50' Recovery 2 x 25' - 4'R	50' Zone 2 2 x 25' - 4'R	50' Recovery 2 x 25' - 4'R	45' Zone 2 2 x 22.5' - 4'R
23		50' Recovery 2 x 25' - 4'R	50' Zone 2 2 x 25' - 4'R	50' Zone 2 2 x 25' - 4'R	50' Recovery 2 x 25' - 4'R	45' Zone 2 2 x 22.5' - 4'R
24		45' Recovery 2 x 22.5' - 4'R	45' Zone 2 2 x 22.5' - 4'R	45' Recovery 2 x 22.5' - 4'R	40' Zone 2	45' Zone 1 2 x 22.5' - 4'R



Warm up/leg speed before all Zone 2 workouts

10' duration

1' @80

1' @85

1' @90

1' @95

1' @100

1' @80

6" rev out

54" @85-90

6" rev out

54" @85-90

2' @80

Resistance level 1 on Pro

Resistance level <5 on Trainer

Cadence recommendations

Recovery 80

Zone 1 80-85

Zone 2 85-90



Notes



