

Throughout the duration of a triathlon there are a small number of factors you can control and an even larger amount you can't control. One of the factors every athlete has complete control over is exactly how and when to push your body. Do you swim, bike and run based on how fast you want or think you can go? Or do you pace your race based off of how fast you have been training day in and day out? Sometimes the idea that sounds the most reasonable is often the hardest to execute come race day. It comes as no surprise that QT2 Coaches typically prefer to advise their clients to pace based off their day in and day out training performances. The following details describe how to navigate the QT2 Triathlon Calculator and present the information to your athletes.

QT2 Triathlon Calculator

Let's take a look at the QT2 Triathlon Calculator data entry page, as this is where every pacing plan will begin –

The screenshot displays the QT2 Triathlon Calculator web application. The interface is organized into four main sections for data entry:

- 1 PERFORMANCE INPUTS:** Includes fields for Body Weight (lbs), 400y Pool Swim Time, 20 min Power Test Wattage, OR, 20 min Time Trial Speed, 5K Run Time, Computrainer Ergometer Input, and Computrainer Ergometer Output.
- 2 TRAINING VOLUME INPUTS:** Includes fields for Swim Training Yardage, Bike Training Mileage, Run Training Mileage, and Years of Experience.
- 3 RACE DISTANCE INPUTS:** Includes fields for Swim (mi), Bike (mi), Run (mi), and Bike Course Ascent (ft/mile). It also features checkboxes for Extremely Flat Run Course and Extremely Hilly Run Course.
- 4:** Contains a green button labeled "ESTIMATE RACE TIME" and a link to "Visit QT2's FREE Member area for more info!".

The left sidebar provides navigation options: Calculator Overview, Run Calculator, and Triathlon Calculator. The top navigation bar includes links for Convert, Select, Google, PDFCreator, eBay, Amazon, Coupons, Radio, and Options. The bottom taskbar shows icons for the Triathlon Calculator, Microsoft Outlook, Apple Software Update, and QT2 Pacing - Microsoft Word.

Race Distance Inputs –

1. Swim – Enter the distance of the swim leg of the triathlon in miles. Most common distances - .5 miles, 1 mile, 1.2 miles, 2.4 miles.
2. Bike – Enter the distance of the bike leg of the triathlon. Most common distances – 18 miles, 24 miles, 56 miles, 112 miles
3. Run – Enter the distance of the run leg of the triathlon. Most common distances – 3.1 miles, 6.2 miles, 13.1 miles, and 26.2 miles.

4. Bike Course Accent – Enter the average feet per mile accent of the bike course (# of total feet climbed, divided by the length of the bike course, in miles). There is a link below to common courses. You can also use Garmin data from the course if you or your athlete have the information as a result of pre-riding the course.

For this example for let us assume we have an athlete competing in Lake Placid 2012. So, our race distances will look like the following –

Triathlon Calculator

[Calculator Overview](#)
[Run Calculator](#)
Triathlon Calculator

1 PERFORMANCE INPUTS

Body Weight (lbs):
400y Pool Swim Time:
20 min Power Test Wattage:
OR
20 min Time Trial Speed:
5K Run Time:
Computrainer Ergometer Input: ☐
Computrainer Ergometer Output: ☐

2 TRAINING VOLUME INPUTS

Swim Training Yardage:
Bike Training Mileage:

3 RACE DISTANCE INPUTS

Swim (mi):
Bike (mi):
Run (mi):
Bike Course Ascent (ft/mile):
Extremely Flat Run Course: ☐
Extremely Hilly Run Course: ☐
[View Course Database](#)
Hilly Bike course = 60 ft/mile
Flat Bike course = 10 ft/mile

4

ESTIMATE RACE TIME ►

Training Volume Inputs -

Training Volume - To input the volume your athlete has obtained simply look at the histogram created for your athlete and input the peak distances trained for each event. For simplicity's sake, let's assume that our athlete swam 12,000 yards, rode 350 miles, and ran 47 miles. The calculator would now look like the following –

The screenshot shows the 'Triathlon Calculator' website. The browser address bar displays 'http://www.qt2systems.com/triathlon-calculator/'. The page is divided into four main sections for data entry:

- 1 PERFORMANCE INPUTS:** Includes fields for Body Weight (lbs), 400y Pool Swim Time, 20 min Power Test Wattage, 20 min Time Trial Speed, 5K Run Time, Computrainer Ergometer Input, and Computrainer Ergometer Output.
- 2 TRAINING VOLUME INPUTS:** Includes fields for Swim Training Yardage (12000), Bike Training Mileage (300), Run Training Mileage (47), and Years of Experience.
- 3 RACE DISTANCE INPUTS:** Includes fields for Swim (mi) (2.4), Bike (mi) (112), Run (mi) (26.2), Bike Course Ascent (ft/mile) (77), and checkboxes for Extremely Flat Run Course and Extremely Hilly Run Course.
- 4:** A section with a green 'ESTIMATE RACE TIME' button and a link to 'Visit QT2's FREE Member area for more info!'.

The Windows taskbar at the bottom shows the time as 11:12 AM on 7/5/2012.

Years of Experience –

Easy! How long has your athlete been training at this volume? It is best to play this as conservatively as possible, as the specific pacing outputs will be more aggressive with a larger input here. Remember, the calculator outputs assume a perfect day of racing, with perfect conditions and execution. Rarely is this actually the case. Never be afraid to underestimate past years of experience, when developing a pacing plan, or determining goals. Our athlete is in just his 2nd year of training with QT2, so our calculator would now look like the following –

This screenshot is identical to the one above, but with the 'Years of Experience' field in the '2 TRAINING VOLUME INPUTS' section set to '0'.

Performance Inputs –

1. **Body Weight** – Simple! Input your athletes' most recent body weight from their training log.
2. **Swim – 400y Pool Swim Time** – There are a few different workout indicators you can use to input your athletes estimated 400yd Swim Time.
 - a. **800y Swim Time Trial** – This 800TT should translate fairly well to an anticipated time in a 400y swim by dividing the 800TT time, in seconds, by 2.14. For instance an athlete who swims 12:00:00 in an 800y TT, you would use 5:36:00 for their 400y Swim Time.

$$(12:00\text{min} * 60\text{sec}) = 720 / 2.14 = 336\text{sec} = 5:36$$

- b. **Monster Swim Set (MSS)** – A coach could also use the overall average of the 100y intervals. An example of this would be if an athlete's average time for 100s in the MSS is 1:43, then that is equal to what you can expect for their IM swim pace. Therefore, an appropriate 400y TT will output an average 2.4 mile TT of the same pace as the overall average of the 100s.
3. **Bike – 20 Min Power Test Wattage or 20 Min Time Trial Speed** – When setting up your athlete's pacing plan for the bike you can go about it one of two ways:
 - a. **Power** – You want to give the greatest weight to the training data that is most similar to the planned race intensity. For instance, if you have an athlete racing IM, then using Saturday long rides will be the most appropriate tool. Athletes who are racing HIMs should utilize data from their Z2 intervals. Let us assume that our athlete is training for IM Lake Placid. The athlete's zone 1, is 125-136. A typical outdoor ride, should average at the bottom of Zone 1, so for this athlete that should be 125. This athlete's wattage for this ride is around 197, and their average HR, is 128. So, when aligning this to the Triathlon Calculator, we want to calibrate the wattage so that it falls right to the bottom of the HR zone 1, (125, for this athlete.) This average HR is 3 beats above where we want it to be, (128 vs 125.) Each one of those beats, are equivalent to about 3w, on average. So, to reduce this average HR by 3 beats, we would also have to reduce this average wattage by 9 beats, (3*3=9.) If that ride had been completed at 125bpm, it would have resulted in 188 average watts.(197-9=188)

Example:

128HR=197Watts. Reduce the average HR of 128 to the appropriate average of 125. (128-125=3)

Each beat=3Watts. 3beats over * 3 watts for each beat over=9 watts.

197-9=188watts.

You, as a coach, will want to line up his Z1 wattage so that the 188 is in the middle of the Z1 wattage output from the calculator, because on outdoor rides, the HR, as stated above should line up at the bottom of the Z1, while the wattage should line up in the middle of wattage Z1. This process is a simple guess and check. If we try 301 to start we get the following:

http://www.qt2systems.com/triathlon-calculator/310-form.triathlon.html

Triathlon Calculator | Q... X

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Bradford Strater

NOTE: Estimated transitions added to total time based on split lengths
+ Bike wattage is the approximate average wattage this athlete should maintain for their race given their [speed potential](#) and [critical volume ratio](#)

2

BIKE TRAINING PACES

Zone R:	128	to	171	Watts	14.5	mph
Zone 1:	187	to	213	Watts	17.7	mph
Zone 2:	213	to	240	Watts	19.4	mph
20 min Repeats:	257	Watts			20.9	mph
10 min Repeats:	279	Watts			22.1	mph
5 min Repeats:	300	Watts			23.3	mph
2.5 min Repeats:	321	Watts			24.5	mph

3

RUN TRAINING PACES

Zone R:	08:04	to	08:51	min/mile
Zone 1:	07:17	to	07:49	min/mile
Zone 2:	06:46	to	07:17	min/mile
5K	06:15	min/mile		

WHAT DO THESE INTENSITY RANGES AND REPEAT PACES MEAN?
[Visit QT2 for more information!](#)

11:30 AM 7/5/2012

- b. **Speed** – Calculating an athlete's speed is very similar to using power as an indicator, but we use speed as the indicator. Again, we will want to use training data that is most similar to the expected race intensity to determine your athlete's bike pacing. When using speed as a performance indicator one would want to use a baseline MPH from the athlete's rides. Like wattage, the average speed of an outdoor ride should be calibrated to the bottom of Z1, or other appropriate zone. Let us assume that our IM Lake Placid athlete averages right around 17.5 mph on a Saturday long ride with a HR average of 128. His Zone 1 is 125 – 136. You, as a coach, will want to convert the Z1 ride above (17.5 mph @ 128) to their baseline Z1 effort. In this instance the athletes Z1 begins at 125, so we need to subtract 3bpm from his average. As a guideline each BPM is representative of .25mph. So we would need to subtract 3bpm, or .75mph. This yields their baseline Z1 speed of 16.75mph. Next we start the quick guess and check in the calculator. First we try 290 for the watts and get back the following –

NOTE: Estimated transitions added to total time based on split lengths
 + Bike wattage is the approximate average wattage this athlete should maintain for their race given their [speed potential](#) and [critical volume ratio](#)

2 BIKE TRAINING PACES

Zone R:	123	to	165	Watts	14.2	mph
Zone 1:	180	to	206	Watts	17.3	mph
Zone 2:	206	to	231	Watts	18.8	mph
20 min Repeats:	248	Watts			20.3	mph
10 min Repeats:	269	Watts			21.6	mph
5 min Repeats:	289	Watts			22.7	mph
2.5 min Repeats:	310	Watts			23.8	mph

3 RUN TRAINING PACES

WHAT DO THESE INTENSITY RANGES AND REPEAT PACES MEAN?
[Visit QT2 for more information!](#)

Zone R:	08:04	to	08:51	min/mile
Zone 1:	07:17	to	07:49	min/mile
Zone 2:	06:46	to	07:17	min/mile
5K Repeats:	06:15	min/mile		

We received back average of 17.3, so we would need to lower the indicator input. Try 280 – nope, but closer. Try 277 – Yes! Now we have the following –

Flat Out Run Time: 2:58:24

NOTE: Estimated transitions added to total time based on split lengths
 + Bike wattage is the approximate average wattage this athlete should maintain for their race given their [speed potential](#) and [critical volume ratio](#)

2 BIKE TRAINING PACES

Zone R:	117	to	157	Watts	13.7	mph
Zone 1:	172	to	196	Watts	16.7	mph
Zone 2:	196	to	221	Watts	18.2	mph
20 min Repeats:	237	Watts			19.7	mph
10 min Repeats:	257	Watts			20.9	mph
5 min Repeats:	276	Watts			22	mph
2.5 min Repeats:	296	Watts			23.1	mph

3 RUN TRAINING PACES

WHAT DO THESE INTENSITY RANGES AND REPEAT PACES MEAN?
[Visit QT2 for more information!](#)

Zone R:	08:04	to	08:51	min/mile
Zone 1:	07:17	to	07:49	min/mile
Zone 2:	06:46	to	07:17	min/mile
5K Repeats:	06:15	min/mile		

For the sake of moving on we will stick with the 297w, from our power based example, as the 20 min Power Test Wattage.

4. Run – 5k Run Time – This is very similar to calculating the bike pacing only with minutes per mile received from your athlete’s Garmin. You will want to take their most recent average long run to help you calculate their estimated 5k time. In the case of running, where there is always a constant resistance, the goal should be to line the average HR up with the middle of Z1. For instance, if their long run average is 8:26 at 145bpm, and their Z1 heart rate range is 140 – 150, then you will want to line that 8:26 pace up with the average pace output from the calculator. However, if their runs are not lining up with the exact middle of Z1, you need to adjust that pace to allow for the differentiation. Each beat over or under the middle of Z1, is worth 3 seconds per heartbeat. For example, using the above athlete, whose mid Z1 should be 145, let’s say their long run ended on a 147 HR average (2 beats over) with a pace of 8:20, you will need to adjust their HR down to 145, and add 3 seconds per each beat over to get their adjusted pace, so add 6 seconds in this scenario, making their pace 8:26. On the other hand, if they land under the middle of Z1, let’s say, 143, you will subtract 3 seconds for each beat under. So, if their pace at 143 was 8:32, and you subtract 3 seconds per beat under, their adjusted pace would be back to the 8:26. Let’s look at the calculator, off the bat use 19:56, as a trial 5k run time. We get –

3

RUN TRAINING PACES

Zone R: 08:56 to 09:48 min/mile

Zone 1: 08:04 to 08:39 min/mile

Zone 2: 07:29 to 08:04 min/mile

5K: 06:55 min/mile

Repeats:

1 Mile: 06:35 min/mile

Repeats:

1/2 Mile: 06:12 min/mile

Repeats:

1/4 Mile: 05:45 min/mile

Repeats:

NOTE: Bike training speeds are approximate and are based on an average terrain course with typical training gear.

WHAT DO THESE INTENSITY RANGES AND REPEAT PACES MEAN? [Visit QT2 for more information!](#)

FuelBelt iQ KESTREL fast: splits

So, the calculator is indicating that if your athlete can run a 19:56 your athlete should average between an 8:04 and an 8:39 pace. The average of those paces would be 8:22, which is a bit too quick for our athlete. On the fourth try we use 20:08 for the 5k and get the following –

http://www.qt2systems.com/triathlon-calculator/310-form.triathlon.html

Triathlon Calculator | QT2 S...

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Convert Select

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Search PDFCreator eBay Amazon Coupons Radio Options

10 min Repeats: 275 Watts 21.9 mph

5 min Repeats: 296 Watts 23.1 mph

2.5 min Repeats: 317 Watts 24.2 mph

3

RUN TRAINING PACES

Zone R: 09:02 to 09:54 min/mile

Zone 1: 08:09 to 08:44 min/mile

Zone 2: 07:34 to 08:09 min/mile

5K 06:59 min/mile

Repeats:

1 Mile 06:39 min/mile

Repeats:

1/2 Mile 06:16 min/mile

Repeats:

1/4 Mile 05:48 min/mile

Repeats:

WHAT DO THESE INTENSITY RANGES AND REPEAT PACES MEAN?
[Visit QT2 for more information!](#)

NOTE: Bike training speeds are approximate and are based on an average terrain course with typical training gear.

Triathlon Cal... Apple Softw... QT2 Pacing ... Inbox - Bradf... 3 Reminders Microsoft Ex... Dawn McLo... 1:41 PM 7/5/2012

If you notice the exact middle of the Z1 range for this athlete is now 8:26 on the calculator. Perfect! It looks like our athlete should run approximately a 3:49 marathon.

Final Triathlon Calculator –

http://www.qt2systems.com/triathlon-calculator/

Triathlon Calculator | QT2 S...

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Run Calculator

Triathlon Calculator

1 PERFORMANCE INPUTS

Body Weight (lbs): 160

400y Pool Swim Time: 5:24

20 min Power Test Wattage: 297

OR

20 min Time Trial Speed:

5K Run Time: 20:08

Computrainer Ergometer Input: ☐

Computrainer Ergometer Output: ☐

2 TRAINING VOLUME INPUTS

Swim Training Yardage: 12000

Bike Training Mileage: 350

Run Training Mileage: 47

Years of Experience: 0

3 RACE DISTANCE INPUTS

Swim (mi): 2.4

Bike (mi): 112

Run (mi): 26.2

Bike Course Ascent (ft/mile): 77

Extremely Flat Run Course: ☐

Extremely Hilly Run Course: ☐

[View Course Database](#)

Hilly Bike course = 60 ft/mile

Flat Bike course = 10 ft/mile

4

[ESTIMATE RACE TIME](#)

How does this calculator work?
[Visit QT2's FREE Member area for more info!](#)


INSTRUCTIONS NOTES

Triathlon Cal... Apple Softw... QT2 Pacing ... Inbox - Bradf... 3 Reminders Microsoft Ex... Dawn McLo... 1:45 PM 7/5/2012

Presenting the Pacing to the Athlete

Once you have the outputs from the Triathlon Calculator it is time to present the information to the athlete. This can be best done in an excel format template. You will need to input the information you used for the calculator into the following template:

Personal Information –

		
Athlete:	Joe Athlete	
Race:	Ironman Lake Placid	
Bike Course Ascent (ft/mile):	Hilly / 67 ft	
Run Course:	Average	
Current Body Weight:	160	

Current Performance Indicators –

Current Performance Indicators:

Sport	Result	Source
Swim - 400TT:	5:24	400m TT
Bike - 20-minute Power:	297 watts	Z1/Z2 Rides, Z2 Intervals
Run - 5k Time:	20:08	Z1/Z2 Runs

Durability Indicators –

Durability Indicators:

Sport	Result
Swim (yards):	12,000
Bike (miles):	350
Run (miles):	47
Experience (years):	0

Expected Targets & Outcomes –

Expected Targets & Outcomes:			
Sport	Time Range	Average Pace/Wattage	
Swim:	1:04 - 1:06	1:32/100yds	
Bike:	5:48 - 5:52	19.3 mph	
Run:	3:49 - 3:55	8:45:00 min/mile	
Total:	10:50 - 11:02 *		
*Note: Race time predicted is only an estimate and is provided for entertainment. The purpose of this plan is provide appropriate pacing for your event. Your pacing guidelines below provide this information. Many factors on race day, such as weather, fueling, and road conditions will impact your actual race time outcome.			

Make sure you remember to add 3, 4, and 8 minute windows to each the swim bike and run. This will allow a little range for the time, knowing that the entire triathlon calculator is just a predictor of time, and not absolute.

Pacing Guidelines & Notes:

Swim – Please be sure to include the following. However you are not limited to what is included below. If there is something you believe will help your athlete – INCLUDE IT!

Pacing Guidelines & Notes:
<p>Swim:</p> <p>Out hard, for 400 yards, and then settle in to your pace. Limit kicking until you have about 3 minutes remaining, and then gradually increase your kick's intensity and frequency. See next page for picture of swim course. Start in the second row, and go with the pack. Where they go - you go! The pack will go faster than a single person will go from point A-B.</p>

Bike - Please be sure to include the following notes to the athlete. However you are not limited to what is included below. If there is something you believe will help your athlete – INCLUDE IT! Please note that this also includes talk of their estimated power and HR range.

<p>Bike:</p> <p>Aim for an overall average of 205w, with an absolute wattage cap of 265. The course is a bit hilly, so try to cap the max power at 265 and stick to 205 - 255 on the hills depending on the steepness. Make sure to do your best to keep your power up on the downhill, and remember to stop pedaling and tuck when RPMs hit 100. We might run into a bit of wind. When riding into a headwind, keep wattage between 190 and 205, and cadence high (92-93). When riding with a tailwind, keep wattage between 210 - 230, and cadence between 88 and 90. Aim for an overall average HR of 138. In general, choose gearing that allows you to ride at your goal wattage AND 90rpm.</p>

Run - Please be sure to include the following notes to the athlete. However you are not limited to what is included below. If there is something you believe will help your athlete – INCLUDE IT! Please note that this also includes talk of their estimated pace in relation to their HR range.

<p>Run:</p> <p>Run the first mile at 8:00 pace and hold this as long as possible. You will naturally fade a bit, but no single mile should be slower than 9:00, ending with an average pace of 6:59. If you feel like you are going to explode, immediately drop back to 9:00 pace and allow yourself to regroup, and begin ratcheting the pace back towards the goal average. Average HR should end up around 151 bpm.</p>
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Additional Pacing Tools:

Pacing Matrix – See the attached matrix for additional pacing suggestions for the swim, bike, and run.

	Olympic	Half IM	IM
S w i m	Out hard first 400. Limit kicking until final 3 - 4 mins. Increase kicking frequency last 3 - 4 mins as well.	Out hard first 400. Limit kicking until final 3 - 4 mins. Increase kicking frequency last 3 - 4 mins as well.	Out hard first 400. Limit kicking until final 3 - 4 mins. Increase kicking frequency last 3 - 4 mins as well.
B i k e	Power Cap=Average+70w; Hills - Up to Power Cap; Headwind - 0 to 10 watts less than anticipated average; Cadence 92-93; Tailwind - 5 to 15 watts above anticipated average with cadence of 88-90	Power Cap=Average+60w; Hills - Up to Power Cap; Headwind - 0 to 10 watts less than anticipated average; Cadence 92-93; Tailwind - 5 to 15 watts above anticipated average with cadence of 88-90	Power Cap=Average+50w; Hills - Up to Power Cap; Headwind - 0 to 10 watts less than anticipated average; Cadence 92-93; Tailwind - 5 to 15 watts above anticipated average with cadence of 88-90
R u n	Anaerobic Athletes start out 7s/mile faster than anticipated average pace Aerobic Athletes start out at anticipated average pace, maybe 3-5s/mile faster	Anaerobic Athletes start out 15s/mile faster than anticipated average pace Aerobic Athletes start out at anticipated average pace, maybe 3s/mile faster	Anaerobic Athletes start out 30s/mile faster than anticipated average pace Aerobic Athletes start out at anticipated average pace

Heat and the effect on HR – In the future we will discuss how to adjust an athlete's HR Zones due to the impact of heat, by using your knowledge of your athlete and the athlete's critical volume ratio to adjust their HR targets due to a high heat index.