



## 4X4 Threshold Assessment

Indoor Cycle Instructor Profile  
4X4 Threshold Assessment:

Using a Heart Rate Monitor, this class is designed to assist participants in identifying their Thresholds – (one and two):  $T_1$  and  $T_2$ .

Created by Laura Sachs

Training Type: Fitness assessment and training protocols

Working in HR Zones: 2-4

Cycling Specificity: 3

Class Length: 40 or 60 minutes

### **Objective**

For decades, fitness enthusiasts have used the 220-minus-age formula (age-adjusted maximum heart rate formula) to mathematically calculate HRmax and thereby derive cardiovascular training zones. According to Carl Foster, PhD, FACSM, professor of exercise and sports science at the University of Wisconsin, La Crosse, and past president of the American College of Sports Medicine, "The formula's 220-minus-age is useless. There is no scientific validation for it." To replace this generalized formula, Edwards has developed a half-dozen user-friendly field tests to determine both maximum and threshold heart rates that result in personalized zones for each individual. "The only way to safely and accurately estimate maximum heart rate," she says, "is to take a submax field test. We can no longer rely on equations that were fabricated and invalid."

### **Profile Description:**

After warming up and performing 2 drills, two simple tests are given. 4 X 4: The average heart rate maintained during the two 4 minute periods is equivalent to Threshold  $_1$ . According to Sally Edwards' books and Carl Foster's research there is no difference between the first rise in lactate levels in our blood and the first ventilatory threshold. Threshold $_2$  is touched upon during the Easy/Moderate/Hard drill. The best way to test for Threshold  $_2$  is the sub max test designed by Carl Foster, PhD., called



## 4X4 Threshold Assessment

the "Can you Comfortably Speak" test. During the "Hard" portion of this drill I want participants to go to a heart rate level that they cannot sustain. This will be defined as,  $T_2$ .

### Warm Up

Drill 1.

Ride sequentially - seated, standing, out of saddle buttocks back and low, 20 seconds each for the duration of the song.

Drill 2.

Each time you finish a minute increase the resistance level by 1\*

30 sec. standing, 15 sec. seated tempo, 15 sec. speed.

\*Up 1 gear

30 sec. standing, 15 sec. seated tempo, 15 sec. speed

\*Up 1 gear 1-6 gear changes

Etc. for \*3 more gear changes.

Drill 3. 4X4

Go down and spin it out- recover 1 minute +, till music ends.

4X4 Drill

For 4 minutes sustain the highest heart rate, a RPE of 6 on a scale of 1-10.

I remind students that this is not the highest heart rate they have ever seen, it is the highest rate that they can sustain for 4 minutes. Imagine climbing a long hill; one has to monitor the rate so that they will not become breathless and have to stop. During this drill one is breathing 'hard', but still able to speak.

Record heart rate.

Reduce effort and resistance level for a 2-minute active recovery interval

Begin again and sustain the highest heart rate possible for 4 minutes.

Record this second heart rate.

Add the two numbers and divide by 2. This is your  $T_1$ .

Reduce effort taking a 2-minute active recovery interval.



## 4X4 Threshold Assessment

At this first threshold one improves their fitness level. In subsequent classes you can work out at/about/around this number. For instance if your heart rate averaged 153 then you would cycle maintaining this range 151-155. Your participants now have an anchor from which to work. You can design drills requesting participants to increase 1-5 bpm (154-158) for 20, 40, or 60-second intervals to improve fitness level.

Last drill: Easy/Moderate/Hard:

Easy: In or out of the saddle ride easy for 3 minutes. This is equivalent to the feel of fat tires on a flat road.

Moderate: Increase resistance and/or speed. Ride in or out of the saddle ride at a moderate pace for 3 minutes. This rate should be less than the rate maintained during the 4X4 segments. So that, if one's heart rate averaged 153 during their 4X4 test, ride at 145 or a RPE of approximately 4 or 5. One should be able to speak at this rate.

Hard: Increase resistance and/or speed. Ride in or out of the saddle at the hardest rate you can maintain, even if you cannot maintain this level of intensity the whole 3 minutes. Record this heart rate. This approximates your  $T_2$ .



## 4X4 Threshold Assessment

### Playlist

Song 1	<i>Betece</i> Africando	5:06	
Song 2	<i>New Kid (On the Block)</i> Barenaked Ladies	4:12	
Song 3	<i>Artificial Winter</i> Rusted Root	3:37	
Song 4	<i>Alejandro Vs. In My Head</i> Power Music/Mashup 2	4:00 only	
Song 5	<i>Girl Put Your Records On</i> Corinne Bailey Rae	2:00 only	
Song 6	<i>Think About it Vs. When Love...</i> Power Music	4:00 only	
Song 7	<i>Angeline</i> The Allman Brothers	3:00 only	
Song 8	<i>Concrete and Steel</i> ZZ Top	3:00 only	
Song 9	<i>Burger Man</i> ZZ Top	3:00 only	
Song 10	Your Choice		
Cool Down	<i>Back to You</i> John Mayer	4:02	

I have included a link to a Spotify Playlist that can be found at the post where you downloaded this.

Article in June/Fitness Journal on this topic available on my web site:  
[bodymindfitness.net](http://bodymindfitness.net)