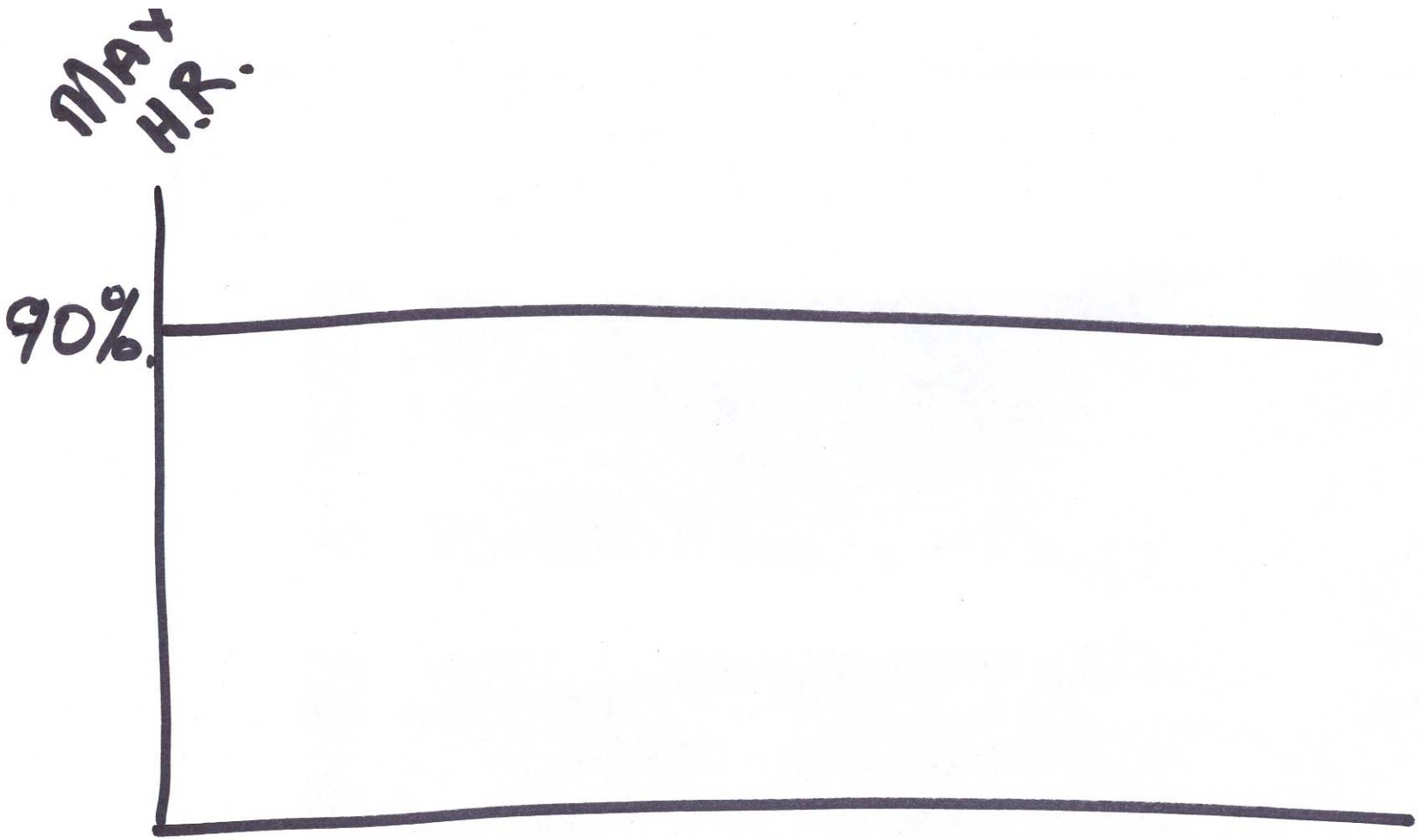
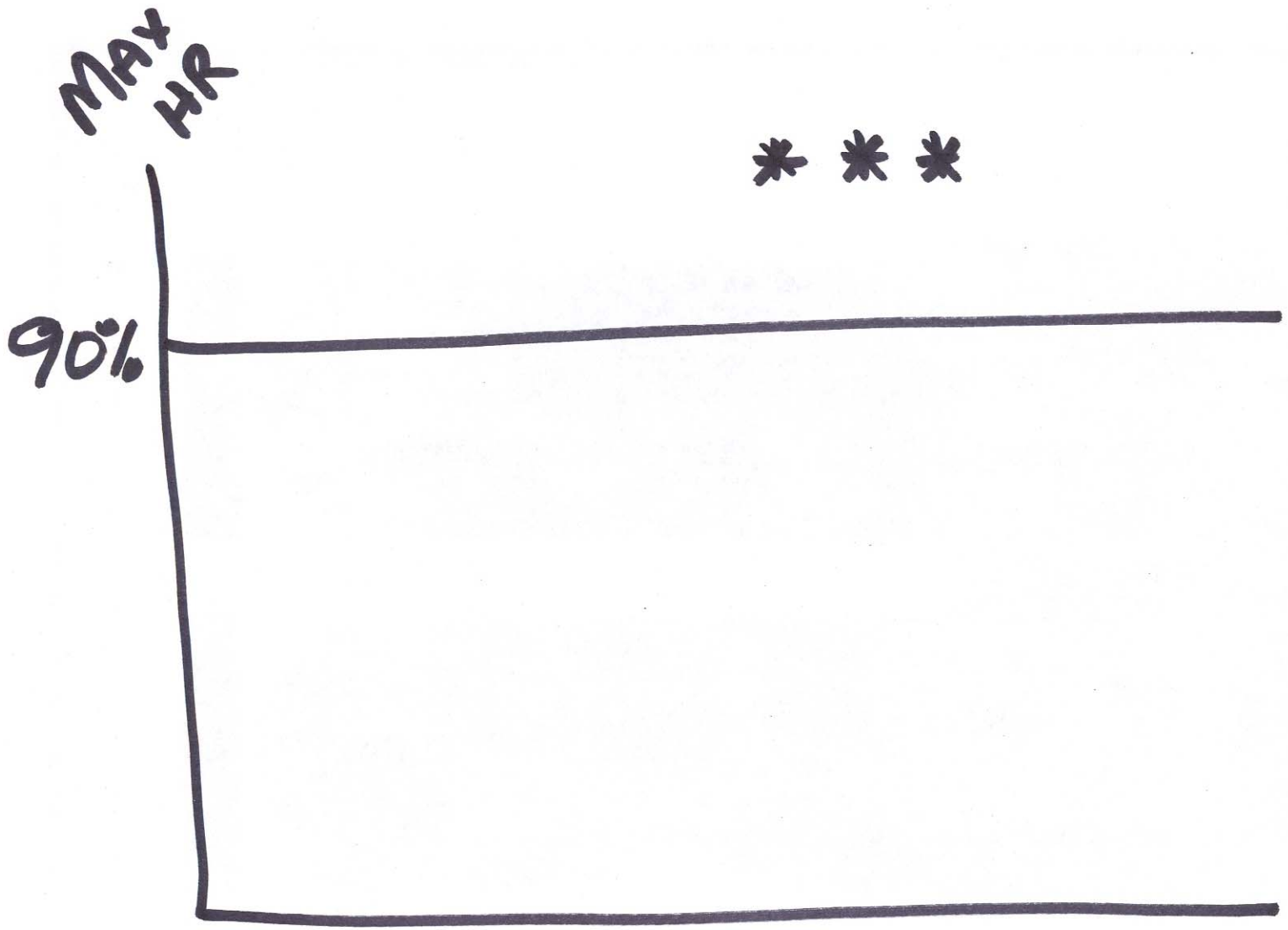

LONGINES
VILLANOVA
UNIVERSITY
VILLANOVA
BALL ON
QTR
DOWN
19

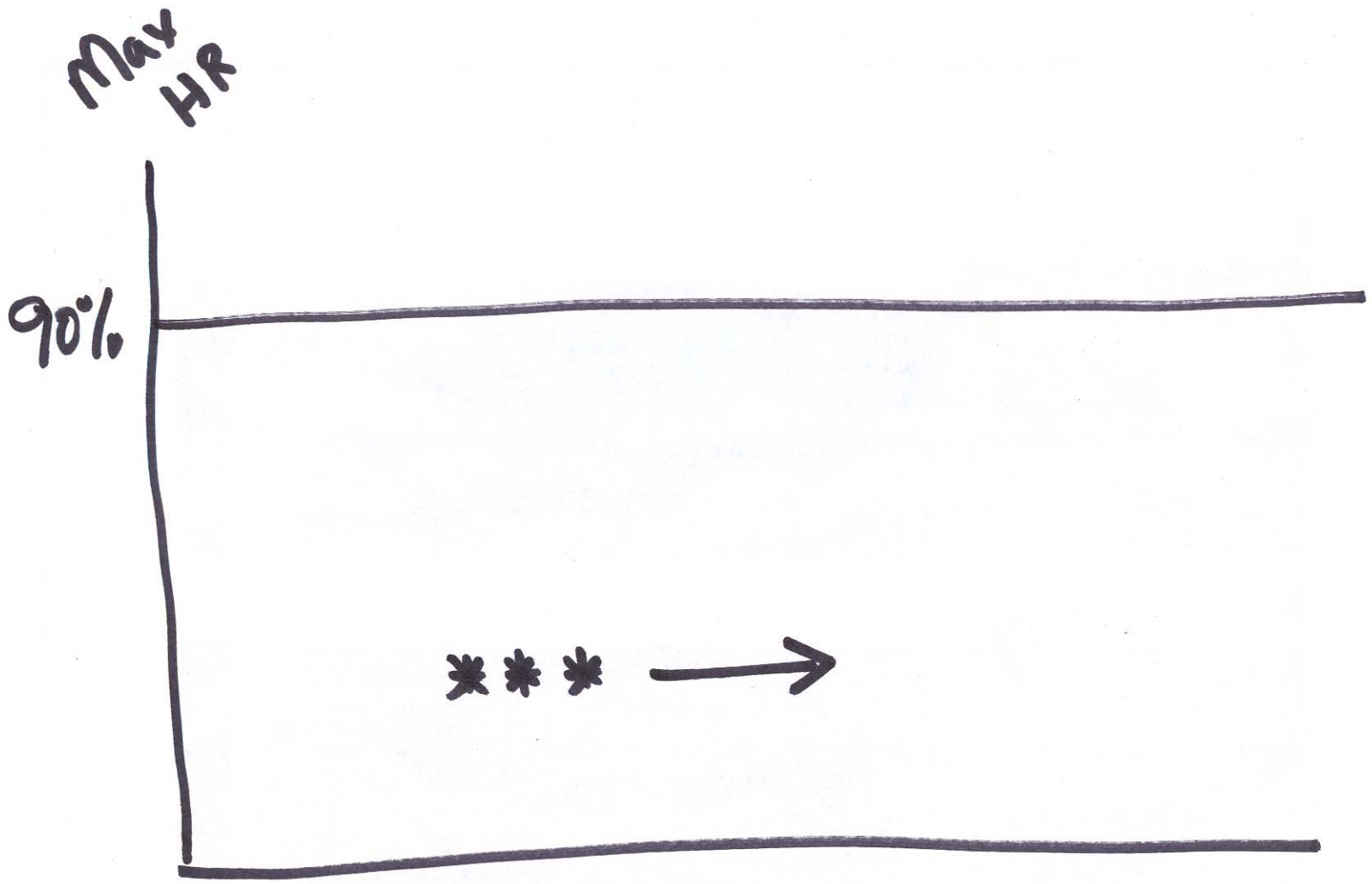

431
591
653

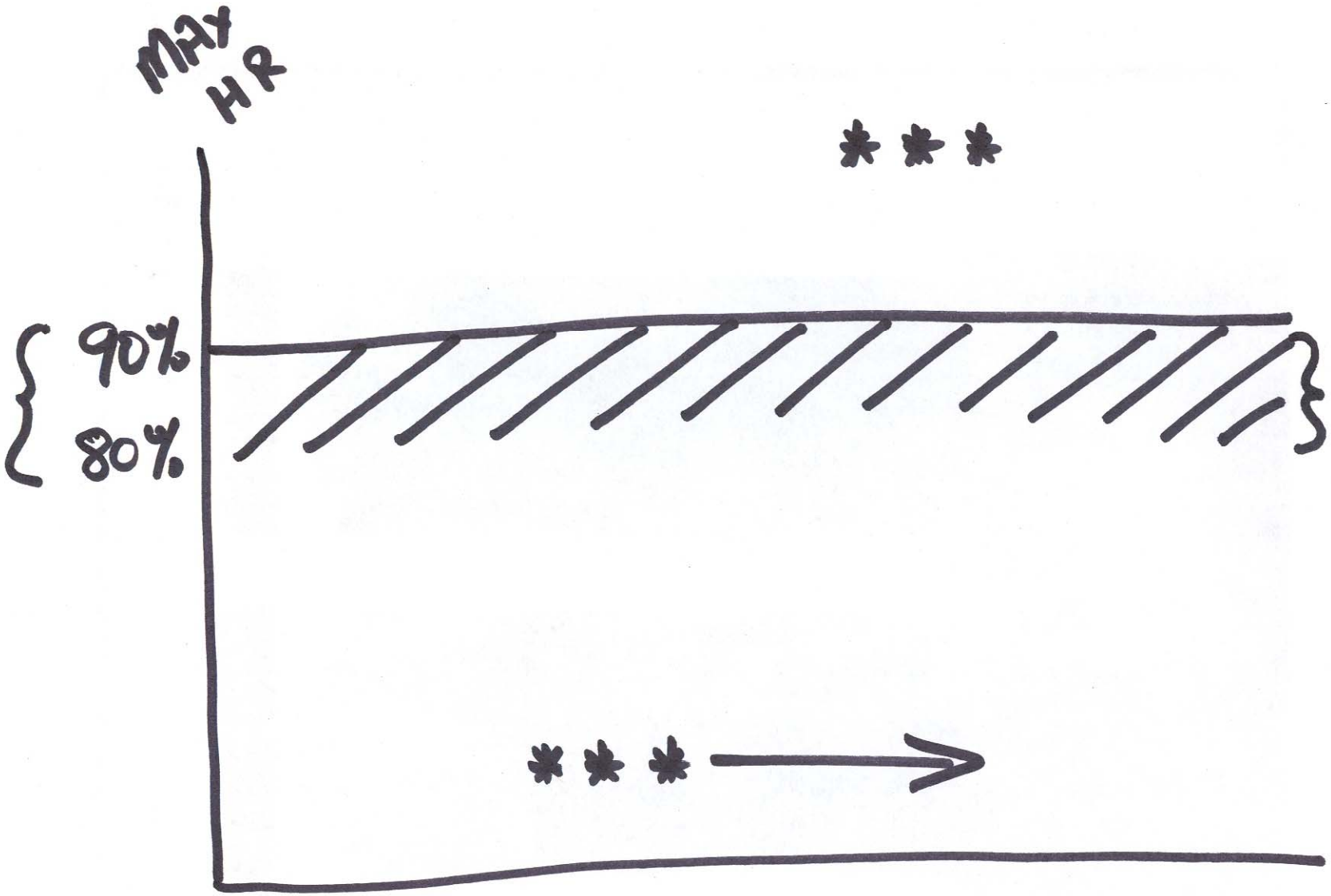

VILLANOVA
ARKANSAS


LA84
388
LA84
470
LA84
84
3
3
2


MAX
H.R.
90%


MAX HR
90%


Max
HR
90%

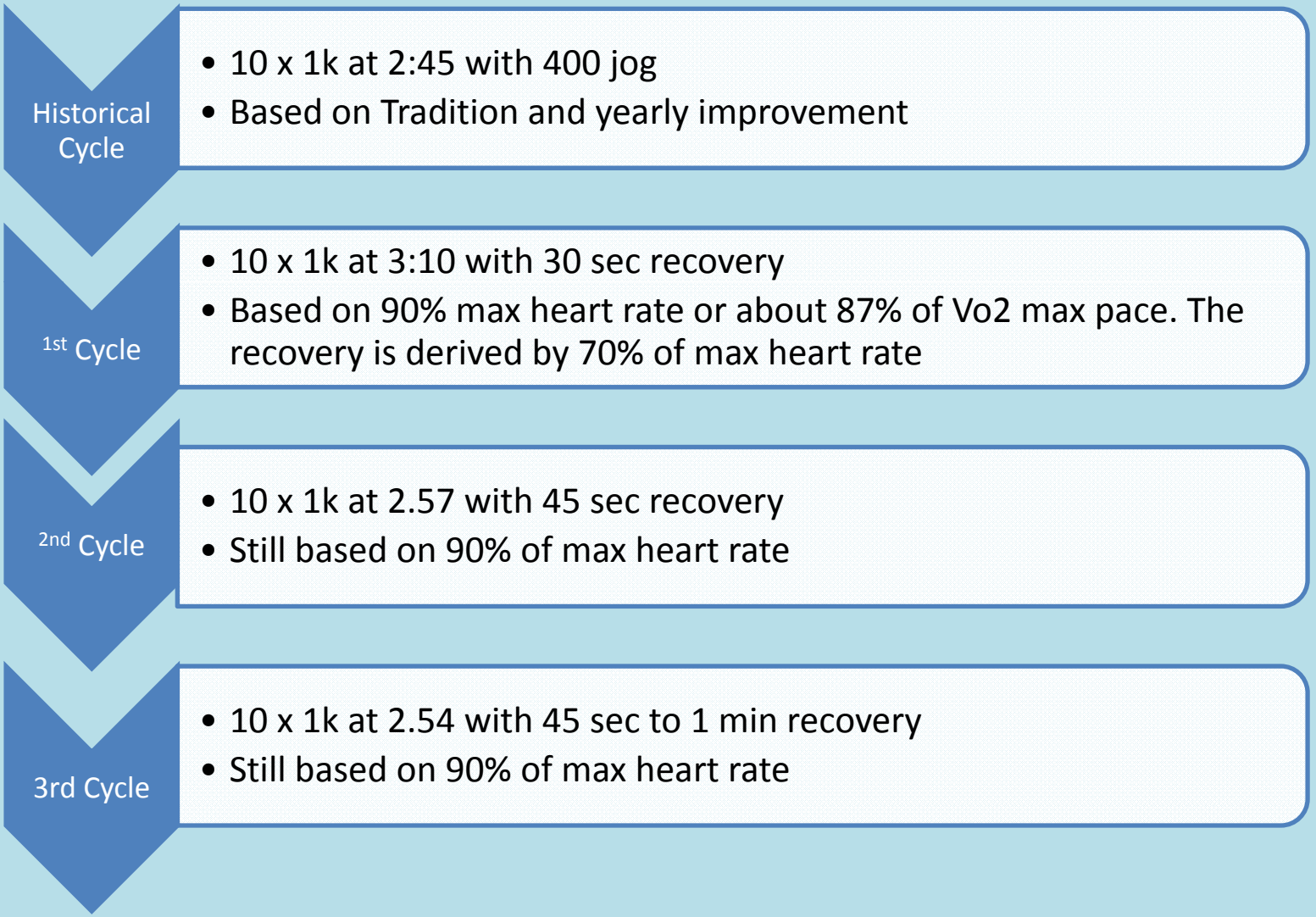

MAX
HR
90%
80%

I. FINDING MAX HEART RATE

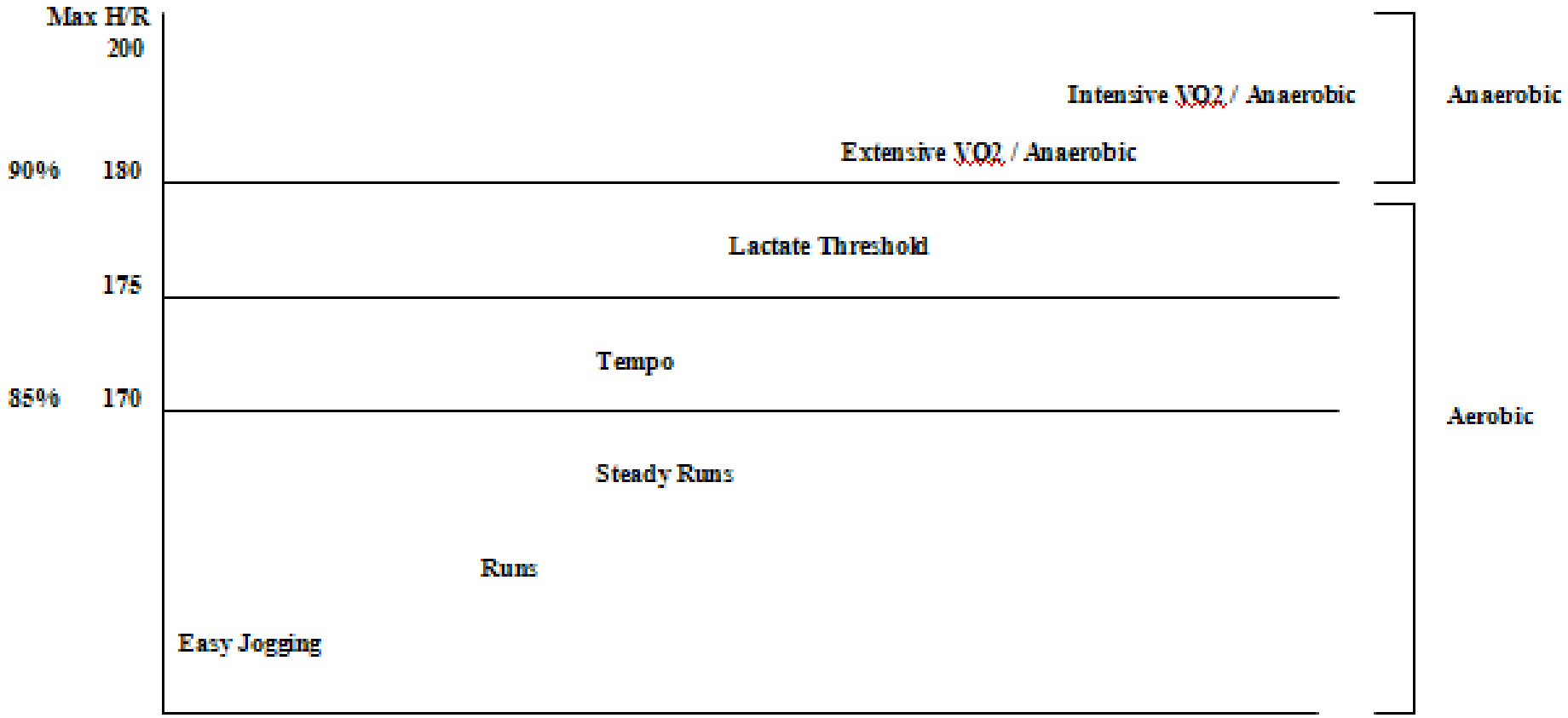
- Treadmill Test
- Using a Heart Rate Monitor.
- Do not guess by using 220 minus your age as the often suggested method; this can lead to errors in the calculation.

II. ALTERNATIVE METHODS TO MAXIMUM HEART RATE.

- Jack Daniels VDOT tables can be used.
- Take your 5K time, add a minute, divide by 5, and that will approximate your threshold pace per 1000m. This pace will be your aerobic training. It can be used in repeats of 1000m's or 1200m's , or repeat miles . Anything faster than this will be more like anaerobic work.

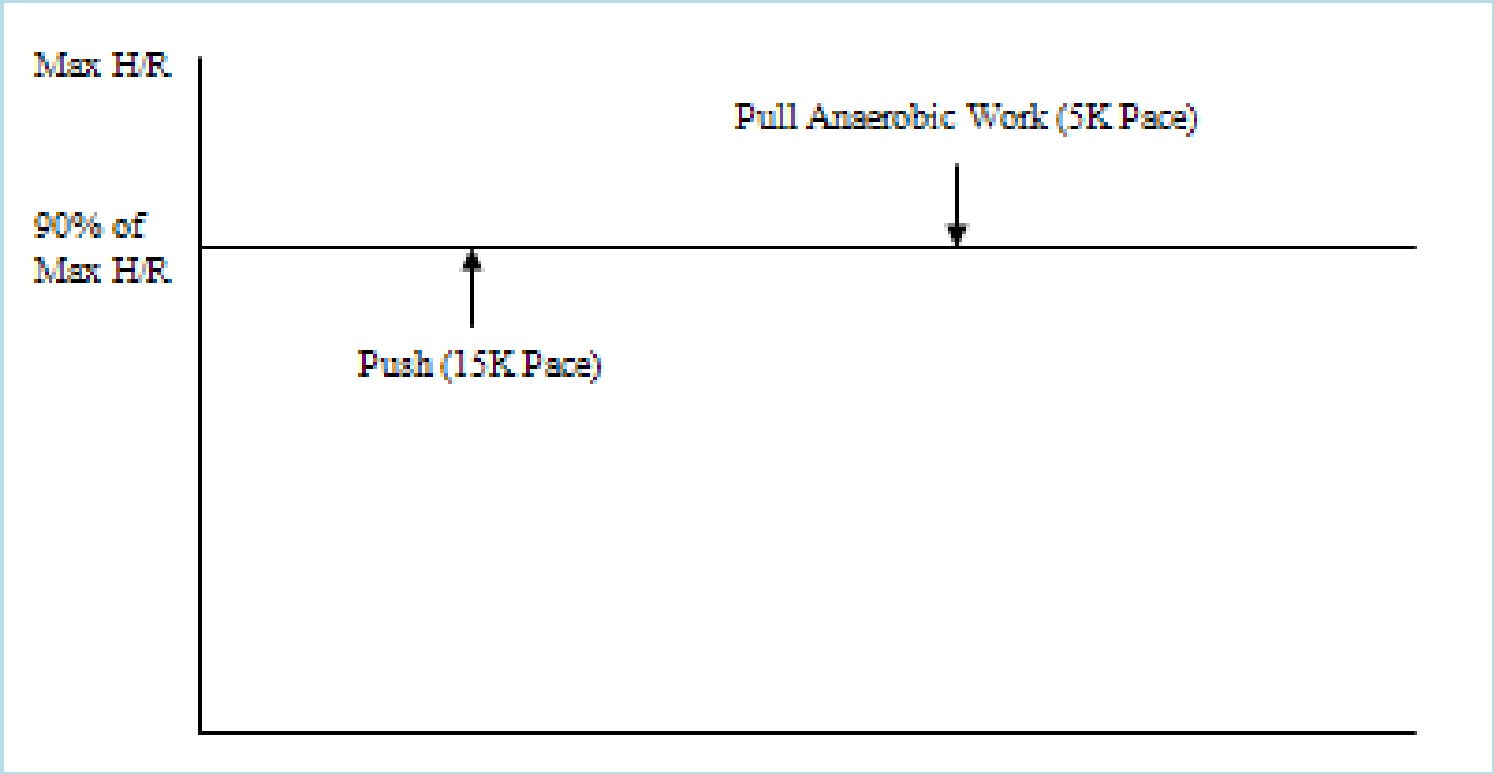

Historical Cycle
• 10 x 1k at 2:45 with 400 jog
• Based on Tradition and yearly improvement
1st Cycle
• 10 x 1k at 3:10 with 30 sec recovery
• Based on 90% max heart rate or about 87% of Vo2 max pace. The recovery is derived by 70% of max heart rate
2nd Cycle
• 10 x 1k at 2.57 with 45 sec recovery
• Still based on 90% of max heart rate
3rd Cycle
• 10 x 1k at 2.54 with 45 sec to 1 min recovery
• Still based on 90% of max heart rate

Heart Rate Correlation to Training



* = Using 200 MAX H/R, this can vary from athlete to athlete

Push Vs. Pull



- **Push:**
  - **Positives:**
  - Non invasive type training. Therefore, the intensity is manageable and there is less chance of injury and less hemoglobin iron problems.
  - Recovery time is quicker after this type of a workout.
  - It builds oxygen carrying capacity essential for all distance running.
  - Very good indicator and predictor of racing times.

  - **Negatives:**
    It's so counterintuitive to most athletes. How can running slower than race pace make you run fast? In the early stages of it's application in training, you will need to explain the importance of doing it. Don't ram it down their throats – explain why it is so important. Most athletes will buy into it this way.
  - Some athletes (particularly in young girls) can't gain confidence in the early stages and you will have to work around the athlete. A few harder intervals along with the threshold will remedy this. However, constant communication and teaching is important.

- **Pull:**
  Positives:
  - It does increase VO2
  - It will give the athlete confidence
  - It is essential – but in small doses
- **Negatives:**
  - Invasive Training: These workouts take longer to recovery (sometimes up to 96 hours) and there is the chance that a second workout or a race too close to this workout will impede the seasonal performance of the athlete.
  - Can lead to low hemoglobin and iron depletion.
  - Can bring a peak on too early and consequently bring the season to a quick ending.
  - Can quickly deplete glycogen stores and bring the athlete into glycogen creep.

In Practice

- Tempo run (High school :a steady state run for about 20 to 25 minutes….. College : 4 to 8 miles) : Keep Heart Rate at 85% of the maximum already established.

- Repeat 800's (women) or miles: 90% of maximum but take enough rest in between for a recovery

Threshold Production Time

10 x 1K @ 3:30

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

Total Work Time = 30:00

Total Productive Time = 22:30

Total Production %:
22:30/30:00 = 75%

Threshold Production Time

10 x 1K @ 3:30

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

Total Work Time = 30:00

Total Productive Time = 22:30

Total Production %:
22:30/30:00 = 75%

6 x Mile @ 5:00

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

Total Work Time = 30:00

Total Productive Time = 25:30

Total Production %:
25:30/30:00 = 85%

Threshold Production Time

10 x 1K @ 3:30

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

Total Work Time = 30:00

Total Productive Time = 22:30

Total Production %: 22:30/30:00 = 75%

6 x Mile @ 5:00

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

Total Work Time = 30:00

Total Productive Time = 25:30

Total Production %: 25:30/30:00 = 85%

5 x 2K @ 6:00

6:00 – 45 secs = 5:15

6:00 – 45 secs = 5:15

6:00 – 45 secs = 5:15

6:00 – 45 secs = 5:15

6:00 – 45 secs = 5:15

Total Work Time = 30:00

Total Productive Time = 26:15

Total Production %: 26:15/30:00 = 87%

Threshold Production Time

10 x 1K @ 3:30

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

3:00 - 45 secs = 2:15

Total Work Time = 30:00

Total Productive Time = 22:30

Total Production %: 22:30/30:00 = 75%

6 x Mile @ 5:00

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

5:00 – 45 secs = 4:15

Total Work Time = 30:00

Total Productive Time = 25:30

Total Production %: 25:30/30:00 = 85%

5 x 2K @ 6:00

6:00 – 45 secs = 5:15

6:00 – 45 secs = 5:15

6:00 – 45 secs = 5:15

6:00 – 45 secs = 5:15

6:00 – 45 secs = 5:15

Total Work Time = 30:00

Total Productive Time = 26:15

Total Production %: 26:15/30:00 = 87%

2 x 5k @ 15:00

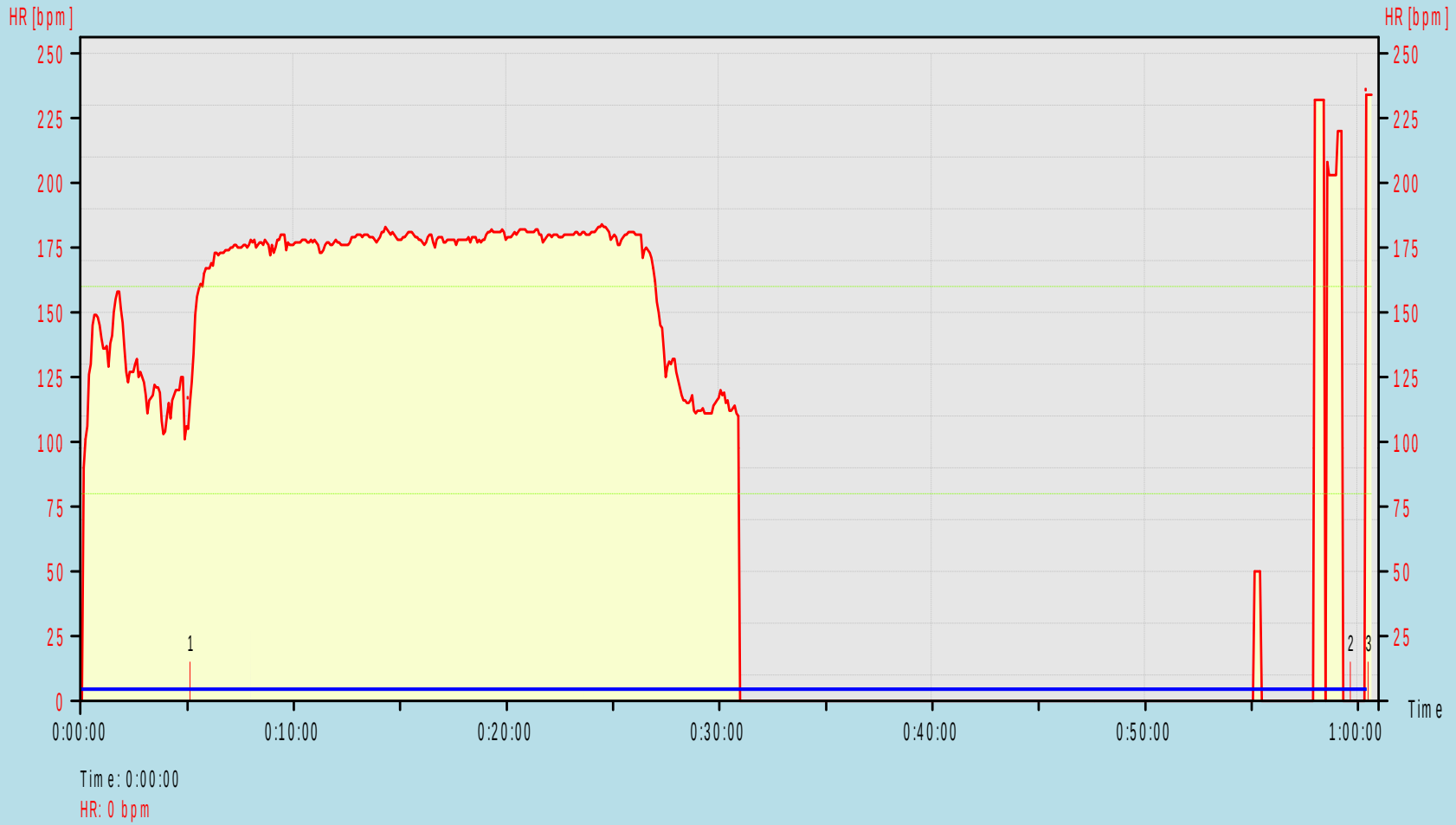
15:00 – 45 secs = 14:15

15:00 – 25 secs = 14:15

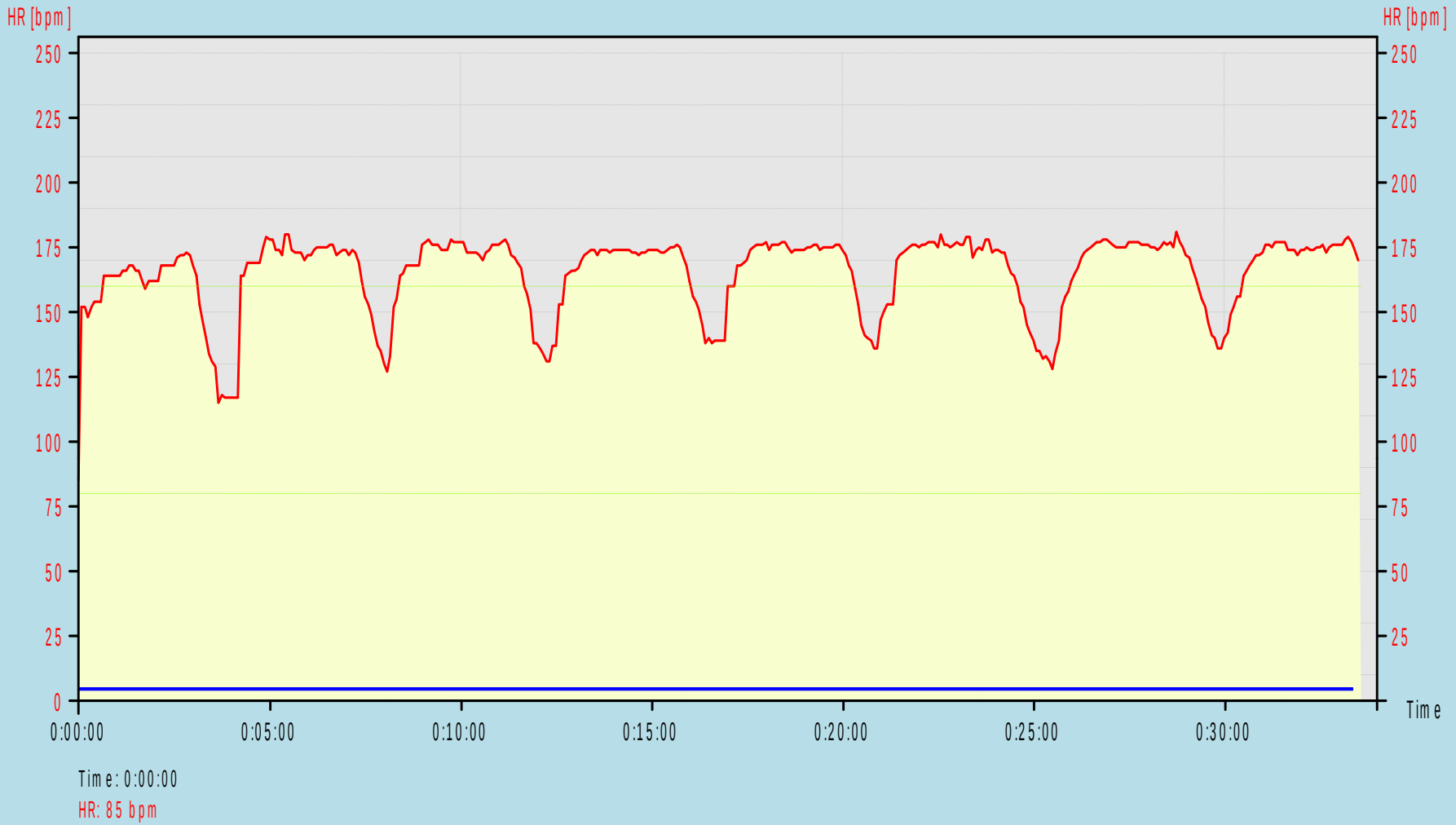
Total Work Time = 30:00

Total Productive Time = 28:30

Total Production %: 28:30/30:00 = 95%

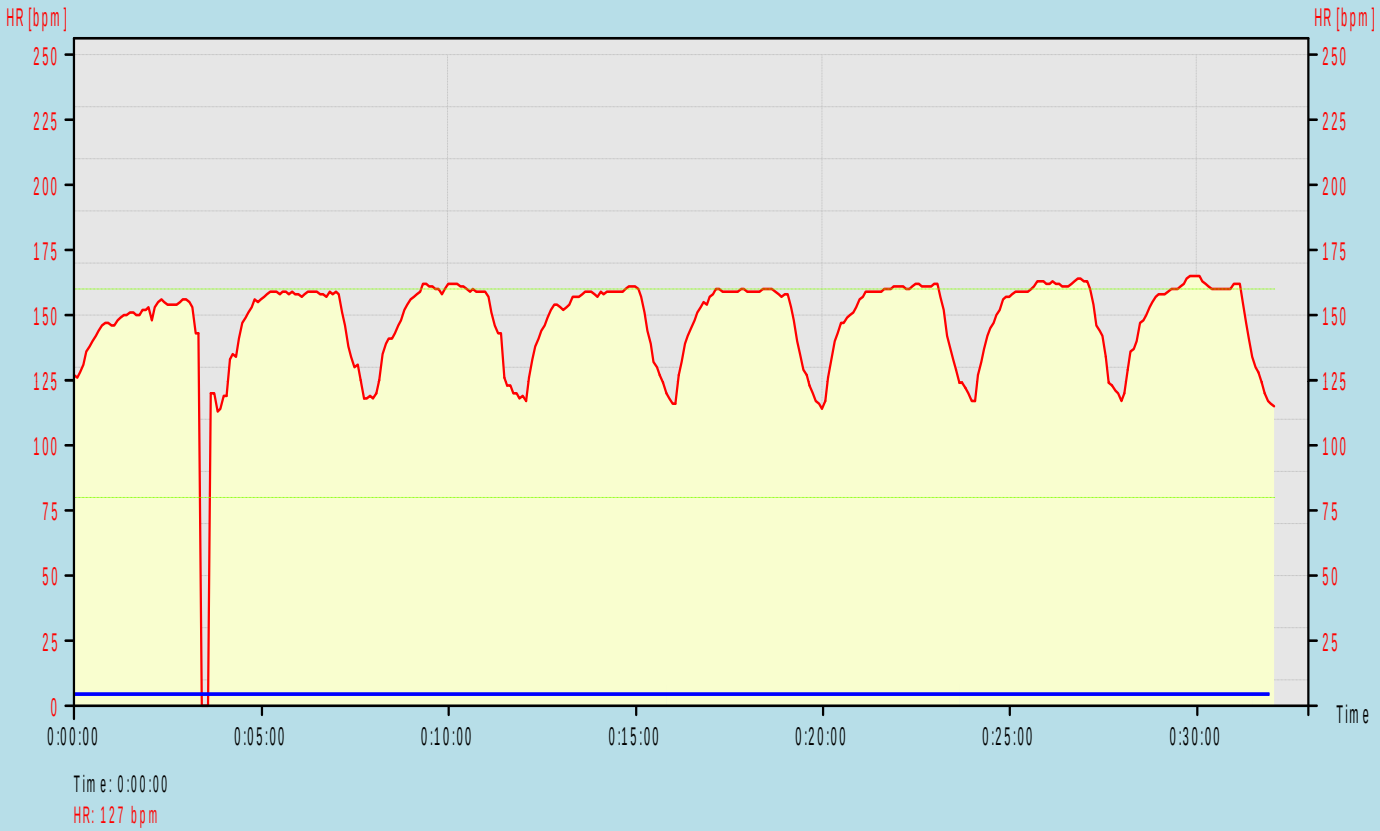


Person	marcus	Date	10/18/2002	Heart rate	163 / 234	Limits 1	80 - 160
Exercise	10/18/2002 10:56 AM	Time	10:56:48 AM	Max. HR	180	Limits 2	80 - 160
Sport	Running	Duration	1:00:43.0	Distance		Limits 3	80 - 160
Note				Selection	0:00:00 - 1:00:40 (1:00:40.0)		



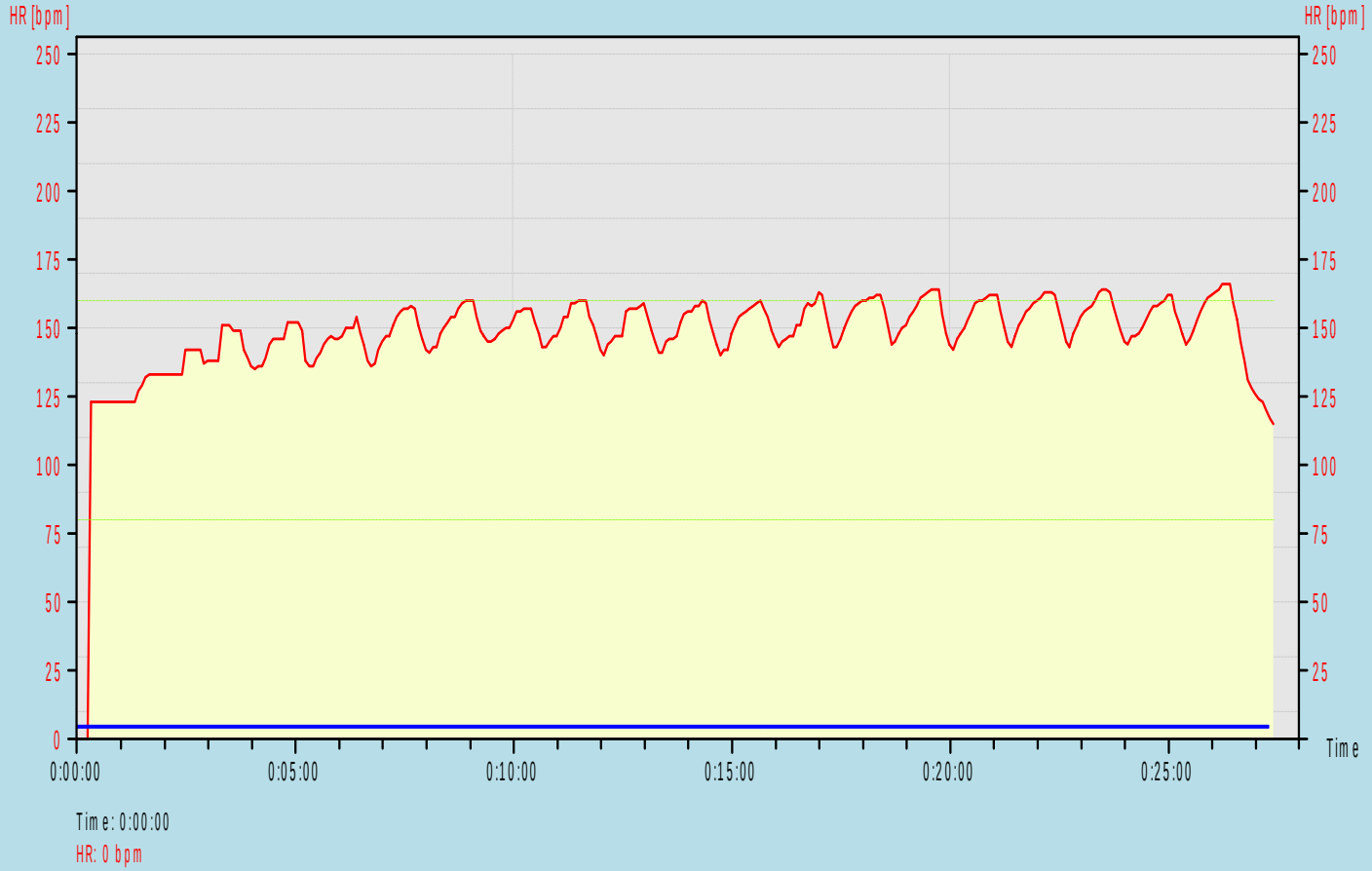
Person	marcus	Date	10/1/2002	Heart rate	165 / 181	Limits 1	80 - 160
Exercise	10/1/2002 3:40 PM	Time	3:40:13 PM	Max. HR	180	Limits 2	80 - 160
Sport	Running	Duration	0:33:35.0	Distance		Limits 3	80 - 160
Note				Selection	0:00:00 - 0:33:30 (0:33:30.0)		

Running in the pool-8x3min



Person	marcus	Date	12/15/2002	Heart rate	148 / 165	Limits 1	80 - 160
Exercise	12/15/2002 4:21 PM	Time	4:21:47 PM	Max. HR	180	Limits 2	80 - 160
Sport	Running	Duration	0:32:07.2	Distance		Limits 3	80 - 160
Note				Selection	0:00:00 - 0:32:05 (0:32:05.0)		

Running in the pool-20x1min

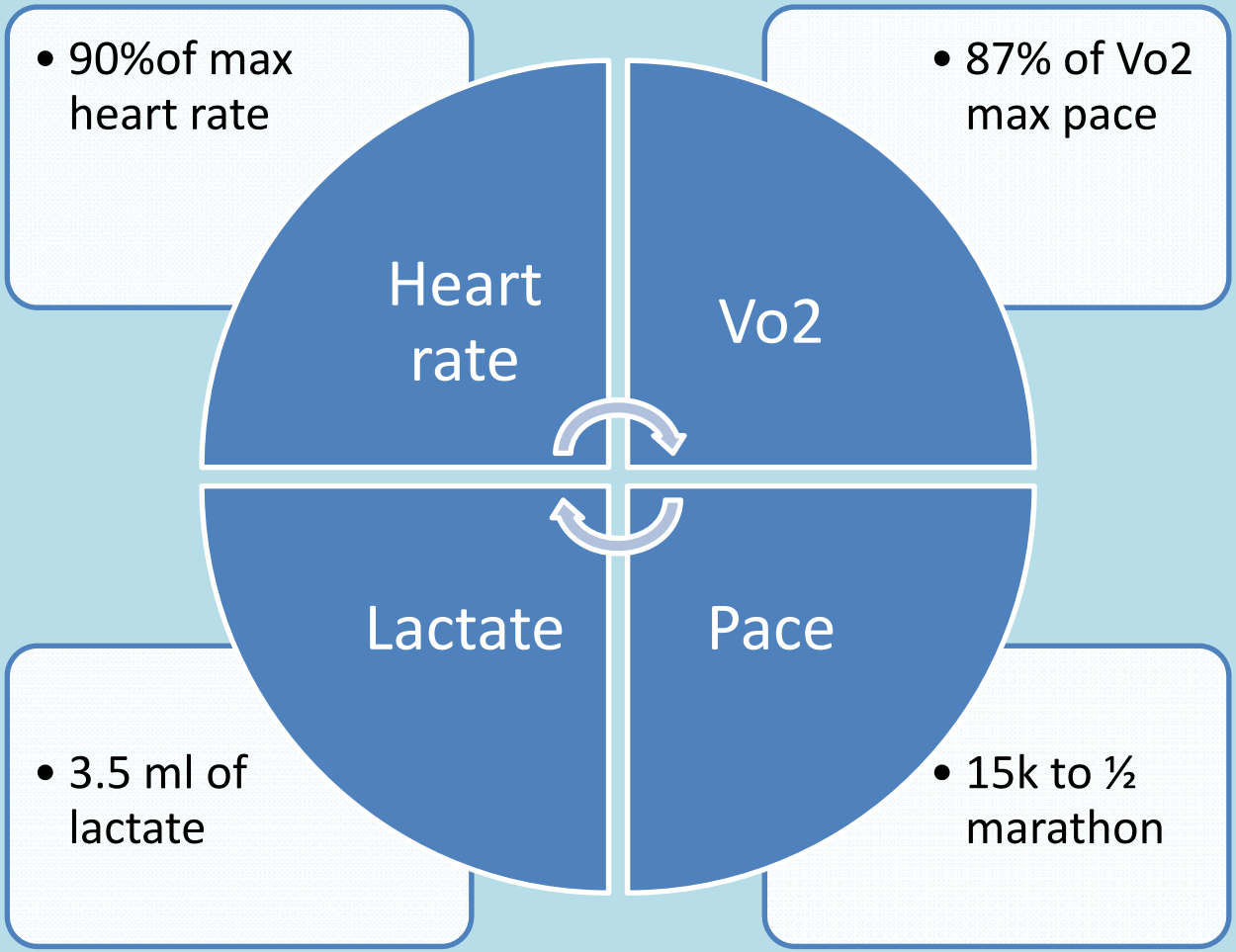


Person	marcus	Date	12/12/2002	Heart rate	148 / 166	Limits 1	80 - 160
Exercise	12/12/2002 4:58 PM	Time	4:58:59 PM	Max. HR	180	Limits 2	80 - 160
Sport	Running	Duration	0:27:26.2	Distance		Limits 3	80 - 160
Note				Selection	0:00:00 - 0:27:25 (0:27:25.0)		

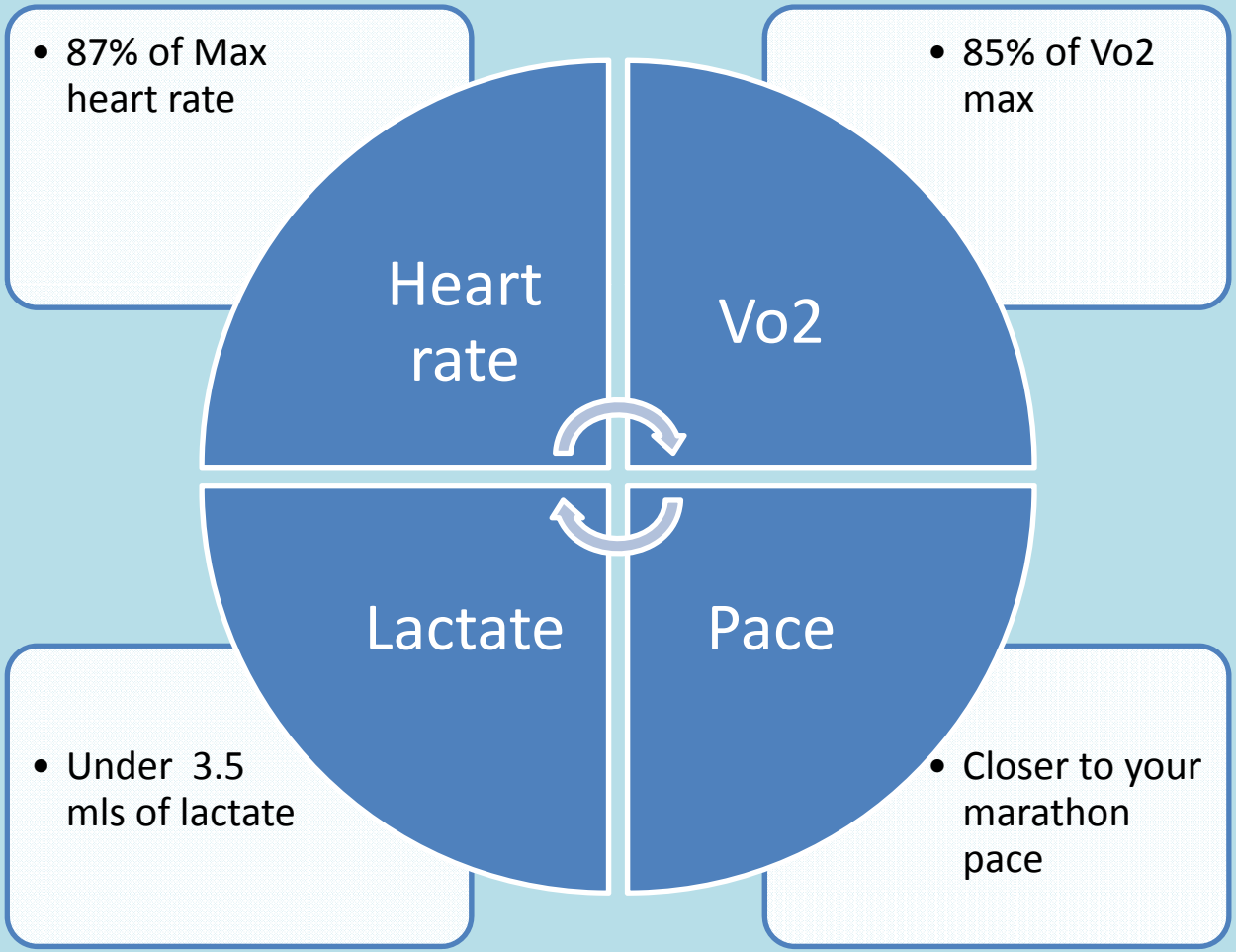
Languages

- The language of pace
- The language of heart rate
- The language of Vo2 Max
- The Language of Lactate

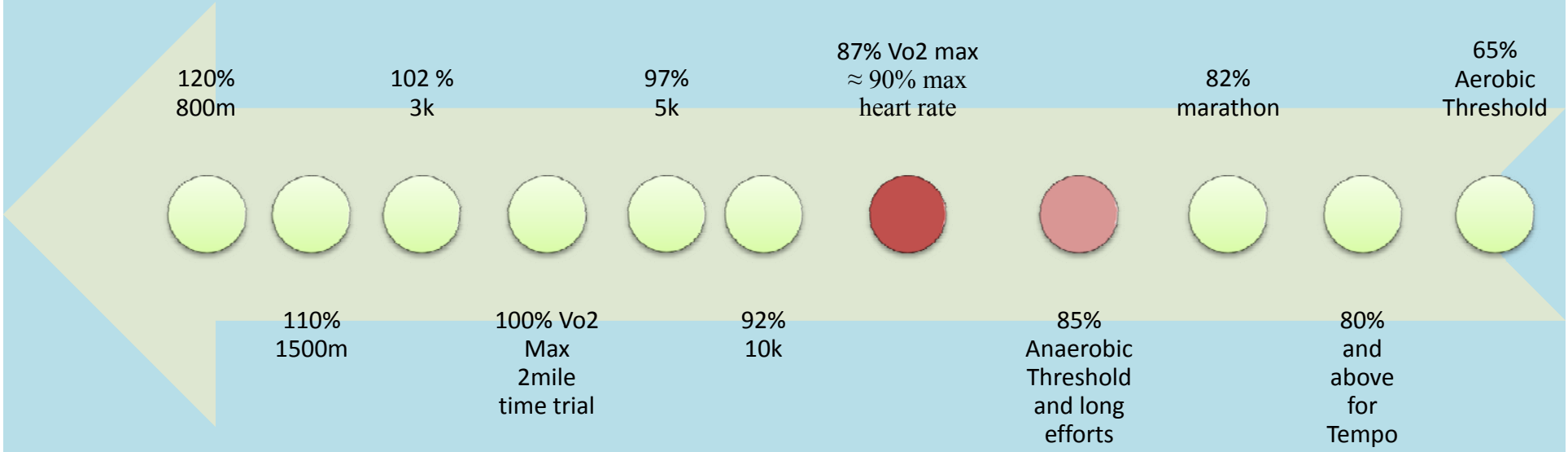
Top end of Anaerobic Threshold



Anaerobic Threshold



Vo2 Effort line



Example of a 10 min 2 miler. Use this value to calculate his anaerobic threshold

Vo2 max

- 10 minutes in the 2 mile
- This is 5 minutes a mile pace. This is the Vo2 max speed

Convert

- Convert Vo2 max speed to seconds
- 5 x 60 = 300 seconds

Calculate anaerobic threshold

- Now calculate the anaerobic threshold by taking 85% of the Vo2 speed
- This is done by dividing … 300 ÷ .85 = 352 seconds = 5min 52 sec mile pace

Example of a 9 min 2miler. Use this value to calculate the anaerobic threshold

- 9 minutes in the 2 mile
- This is 4.30 a mile pace. This is the Vo2 max speed

- Convert Vo2 max speed to seconds
- 4x60 +30 = 270 seconds

- Now calculate the anaerobic threshold by taking 85% of the Vo2 max speed
- This is done by dividing……. 270 / .85= 318 sec or 5min 18sec

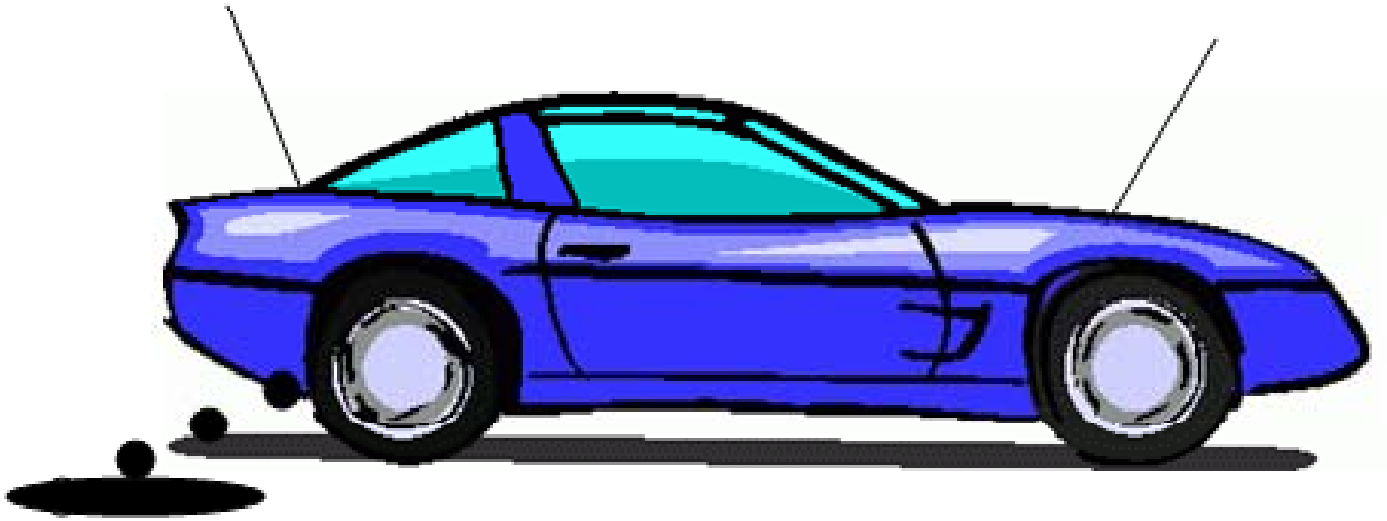
Find Your Event and Look for the Balance

Lactate Threshold / Aerobic

VO2 / Anaerobic

Gas Tank with a Slow Leak

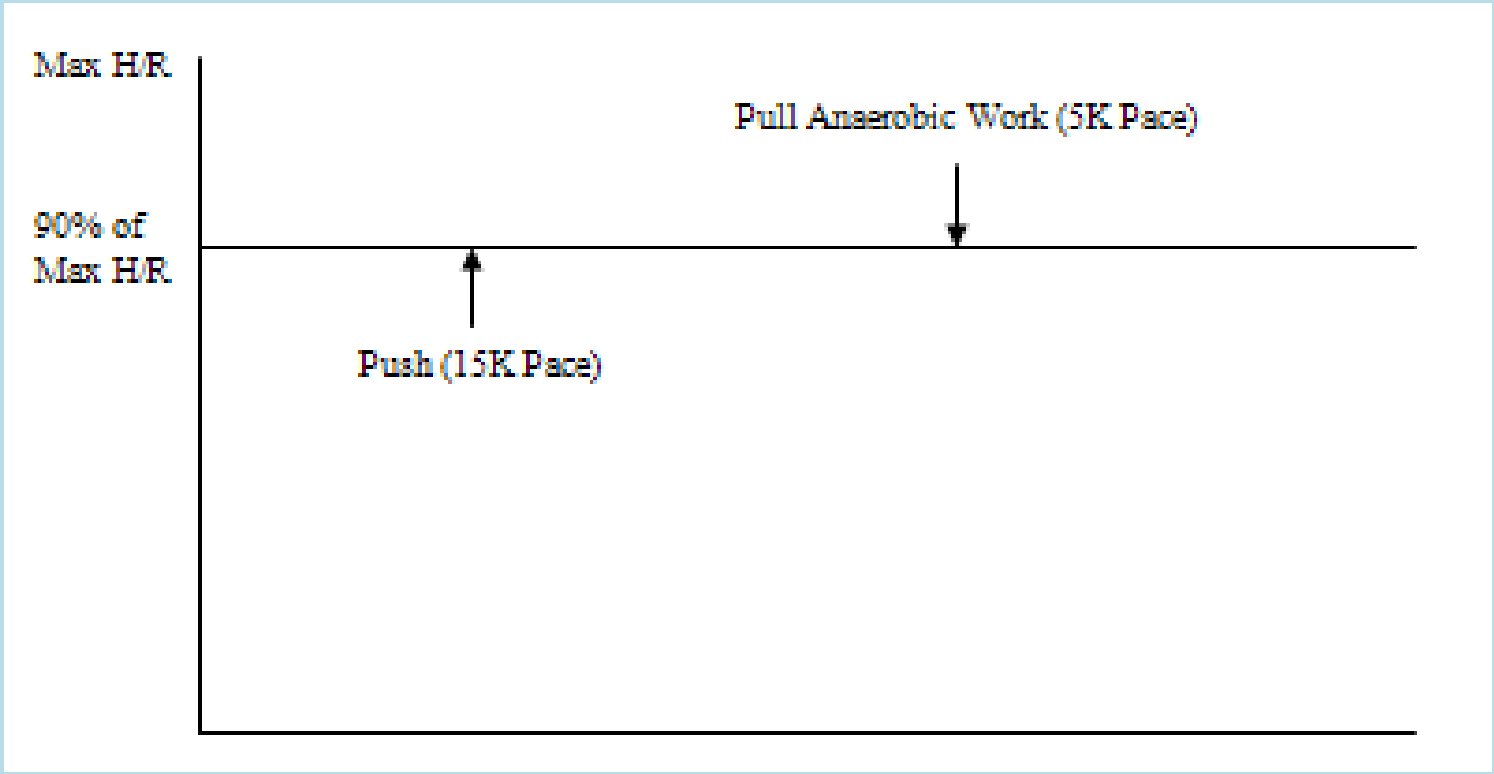
Engine



Leak in the gas tank caused by one of three things:

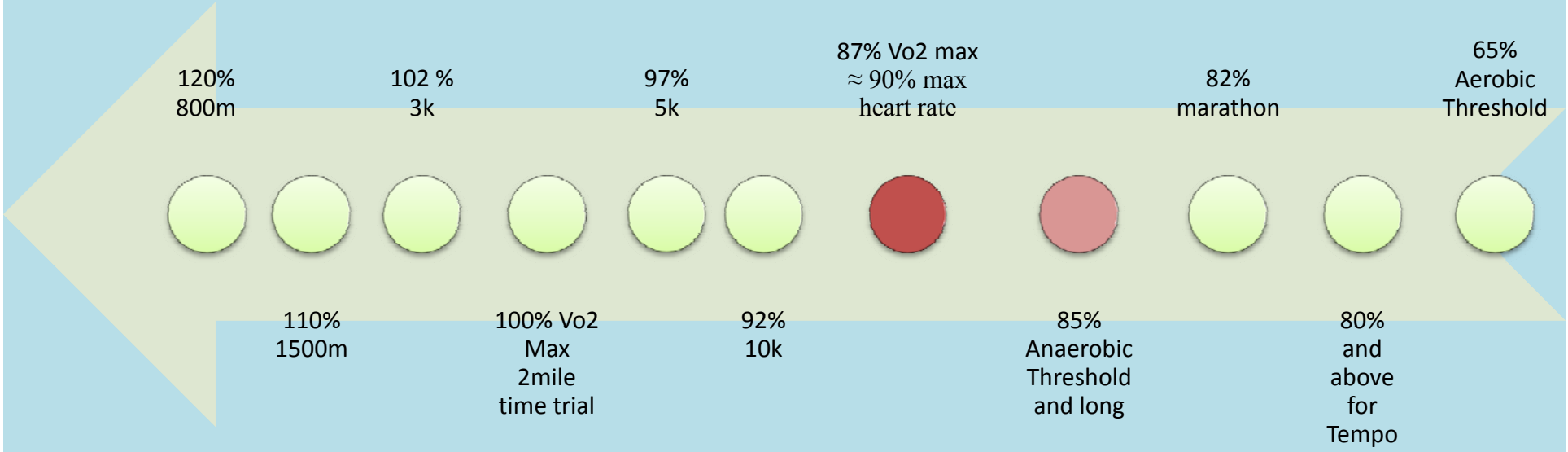
1) Speed work
2) Racing
3) Time-off from running

Push Vs. Pull



Push/Aerobic	**Pull/Anaerobic**
6-8 x 1000m	5 x 1000m
@ 15K pace	@ 5K pace
with 60 sec. recovery recovery	with 3-4 min.
5 x mile	3-4 x mile
@ 15K pace	@ 5K pace
with 90 sec. recovery recovery	with 4 min.
16 x 400	10-12 x 400
@ 10K pace	@ 5K pace
with 100 steady jog	with 200-400 jog

Vo2 Effort line



#3 Lactate System

- Carbohydrates/glycogen is required
- Lactic acid is no longer neutralized
- Lactic acid accumulates to form acidosis
- Oxygen fades from this system.

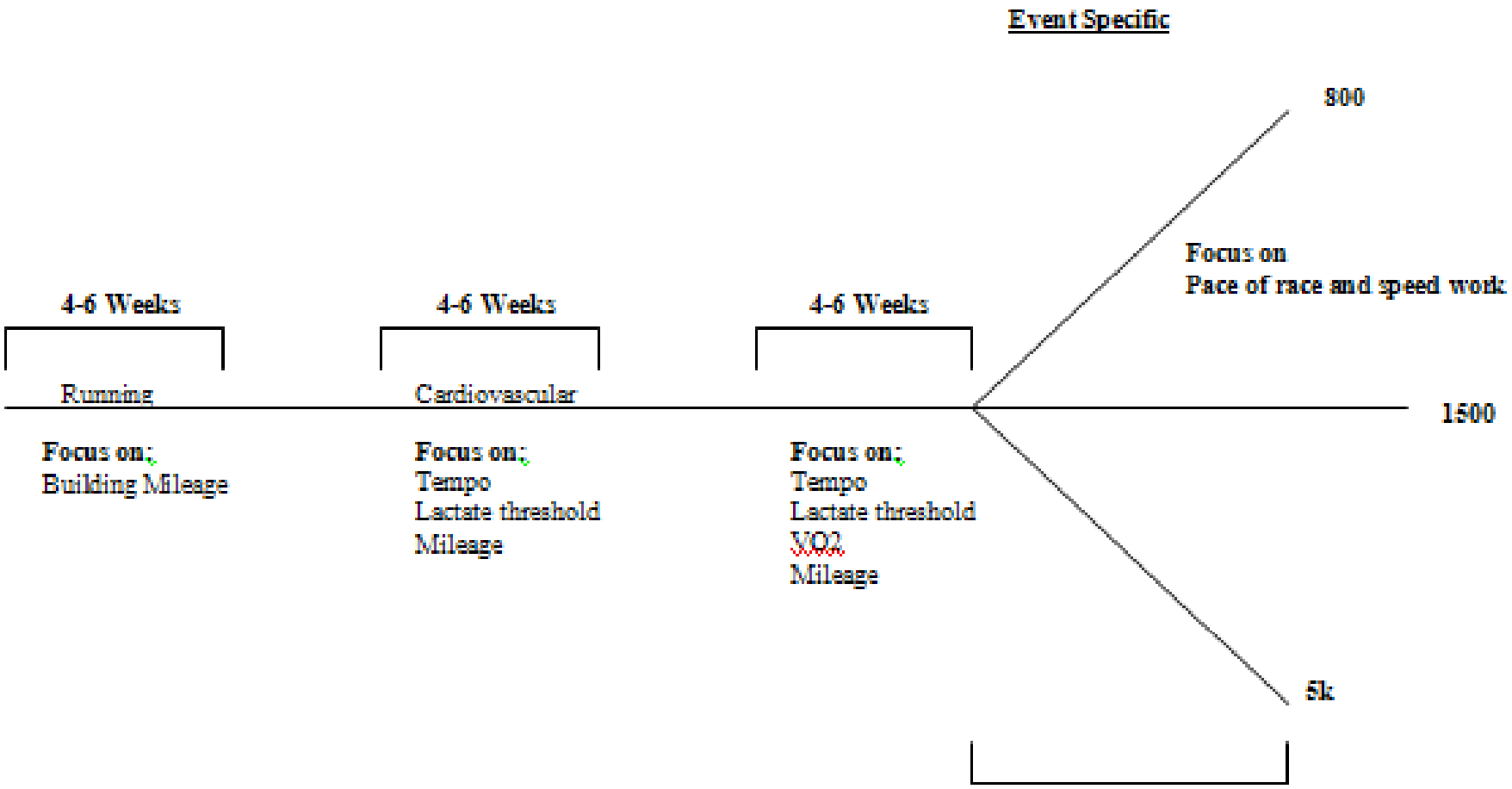
ADP + glycogen -- lactic acid + ATP

When is this system utilized?

- First 2-3 minutes of a race
- Surges & hills
- Final stages and sprint finish

- **Important Points:**
- (1) Acidosis will damage muscle cell walls and decrease aerobic capacity
- (2) It can take from 24-96 hours for things to get back to normal.
- (3) Acidosis in the muscles can increase the chances of injury.
- (4) Glycogen reserves can be heavily depleted.

Putting it all Together



Transition

- Now that the build-up phase is complete (push strategy), a transition into the track season can be done with VO2 type workouts (pull strategy).

Example:
5 x 1000m @ 5k pace with 3-3 1/2 min. recovery

or 4 x 1200m @ 5k pace with 4 min. recovery

or 6 x 800m @ 5k pace with 3 min. recovery

This transition will take about 4 weeks. One workout per week is ample. The transition can be enhanced by taking the workouts above and adapt them to the event you are training for.

- **Example 1:**
- 1600 meters
- 4 x 300 @ (pace: the athlete can race at that time)
- with 100 jog. After the set is complete, give the athlete 5 min. to recovery; i.e. the athlete who is in 4.40 1600 meter shape can run the following:
- or (4 x 300 @ 52-53 with 100 jog) x 3 with 5 min. recovery between the set.
- or (3 x 300 @ 52/53 with 100 jog) x 3-4 times with 5 min. recovery between sets.

- **Example 2:**
- 800 m
- 4 x 200 (@ pace you think the athlete can race at that time) with 100 jog and 5 min. between the sets; i.e., an athlete who can run 2 min. for 800 can run the following:
- or (4 x 200 @ 30 sec. with 100 jog) x 3 with 5 minutes between the sets.

This transition will keep the athlete close to race pace while developing his or her VO2 capacity.

Note: Err on the side of caution when guessing what they can run for their event. Bear in mind that the transition will be done before the season starts and you will have to estimate their racing ability at that particular time of year.

Visual sign: The athlete should be able to complete Set 1 without difficulty. Half of Set 2 should be challenging and most if not all of Set 3 should be a challenge.

3k or 2 mile athlete

Example 3

3x400 with a 200 Jog @ 2 mile race pace

Repeat this 2 to 3 times with 5 min between the sets

So if the athlete runs 10 min for the 2 mile

Then you would do 3x400@75 pace with a 200 jog .Repeat 2 to 3 times depending on the athlete

The Mature 2 miler

8 x 800 @ 5k pace

or

6 x 800 @ 3k pace

or

4 x 800 @ sub 3k pace

All with full recovery

Be creative !

There is nothing set in Stone

The work out could be the following

Mile at 5k pace

4 min recovery

2x800 @ 3k pace

3 min between each

4x400 @ 3k to mile pace

400 jog between

Speed Work

- This will be introduced @ the end of the transition phase to continuing to develop VO2.
- It will be sub race pace with very good amounts of recovery.

Example:

Race type of speed work

5K – 8 x 400 @ 3K pace with 3 min. recovery.

3K – 6 – 8 x 400 @ 1600 – 3K pace with 3 min. recovery.

1600 – 4-6 x 400 @ just below 1600 pace with 3 min. recovery.

800 – 3-4 x 400 @ sub 800 race pace with 3 to 5 min. recovery

- **Lactate Tolerance:**

Training to develop the ability to race with large quantities of lactate.

The workouts will be short

Split 600's

Split 800's

Example:

800 meter athlete with 2.00 ability:

(400 @ just slower than 800 pace – 20 second standing recovery with 200 very hard) x 2-3 times with a 5-6 min. recovery.

400 @ 62 with 20 second recovery followed by 200 @ hard as they can.

This can be done 2-3 times with 5-6 min. recovery.

(600 @ 1600 pace or a bit quicker – 20 second standing recovery with 200 meters very hard) x 3-4 times with 5-6 min. recovery.

(600 @ 1.36 – 20 second recovery followed by 200 meters hard) x 3-4 times with 6 minute recovery.

Lactate Diffusion

- To teach the body to diffuse lactate in a race.
- e.g., (300 meters very hard – 20 sec. standing recovery followed by 400-600 meters @ tempo to threshold) x 4 times with 5 min. recovery.
- This is a hard effort of 300 meters followed by a slow 400 to 600 meters. The athlete will have legs feeling like “jelly” when they set out for the slower portion; however, if it is done correctly, they should be recovering as the slower portion comes to a close.

Speed & Form

- Drills and short speed work – strides and 40 meter pick ups can be done throughout the year. This will aid in all transition moving from cardio build-up to VO2. This can be performed all year round with intervals and breaks with the regular season

  - **100 @ 17 sec.**
  - **Walk back to 110 meters**
  - **110 @ 18 sec.**
  - **Walk back to 120 meters**
  - **120 @ 19 sec.**
  - **Walk back to 130 meters**
  - **130 @ 20 sec.**
  - **Walk back to 140 meters**
  - **140 @ 21 sec……**
  - **Continue to**
  - **200 @ 27 sec.**

Speed Workout:

- Can be used as a secondary workout of the week – fun for the athletes. There is no need to go all the way to the 200 meter start. Any number of repeats is good. The key is to start the first interval (100 meters) at the correct pace. It's harder to do than you think as the pace starts out relatively slow and gradually picks up with the additional second not matching the 10 meter increase in distance.

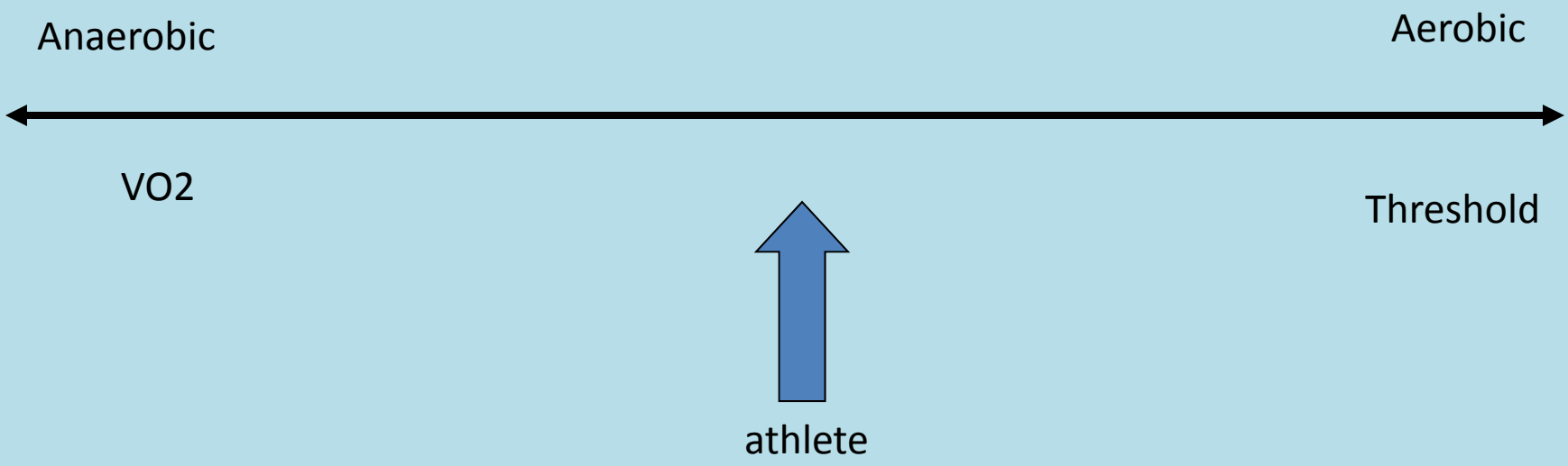
Note: Keep it away from all major races. It can leave the legs heavy for a couple of days.

Early in the season

Early in the season during the build up stage the emphasis will be on the aerobic components of training – mileage, tempo and threshold.

Keep it Balanced

It is safe when you have both anaerobic components and aerobic components

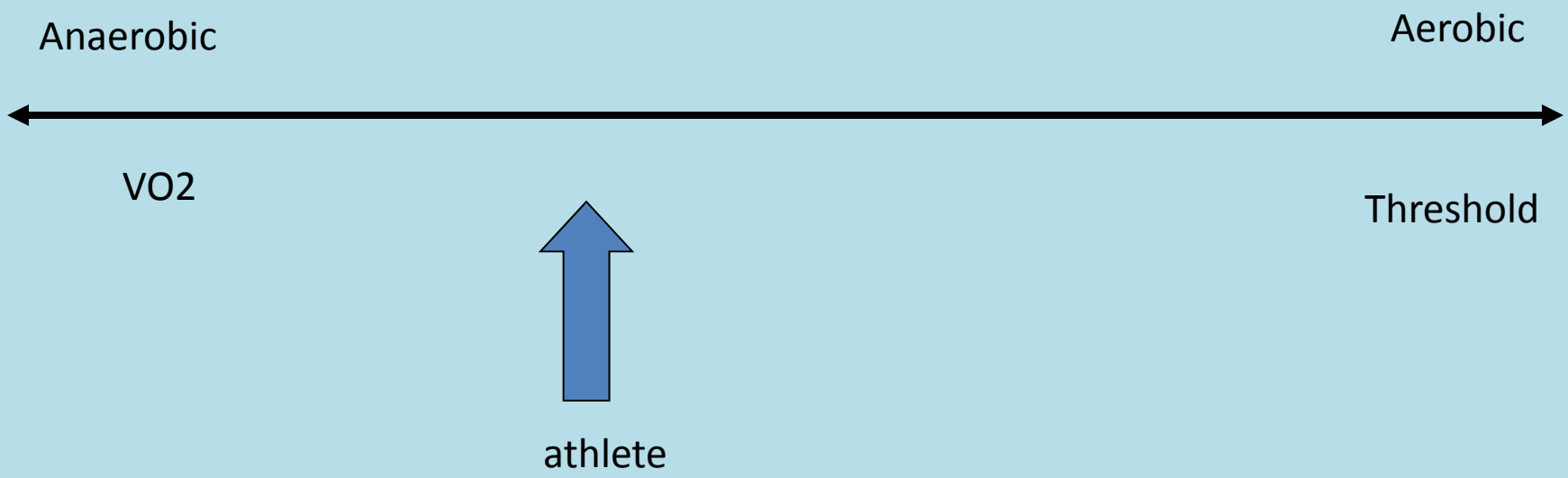


Modification for the athlete

If the athlete responds negative toward hard efforts (anaerobic/ Vo2). Skew the workouts toward threshold and modify the amount of hard efforts. The races will become the anaerobic workouts.

Middle Distance Runners

Middle distance runners are certainly more receptive to anaerobic workouts. Therefore it is usually safe to stay balanced or skew the athlete slightly closer to more anaerobic training

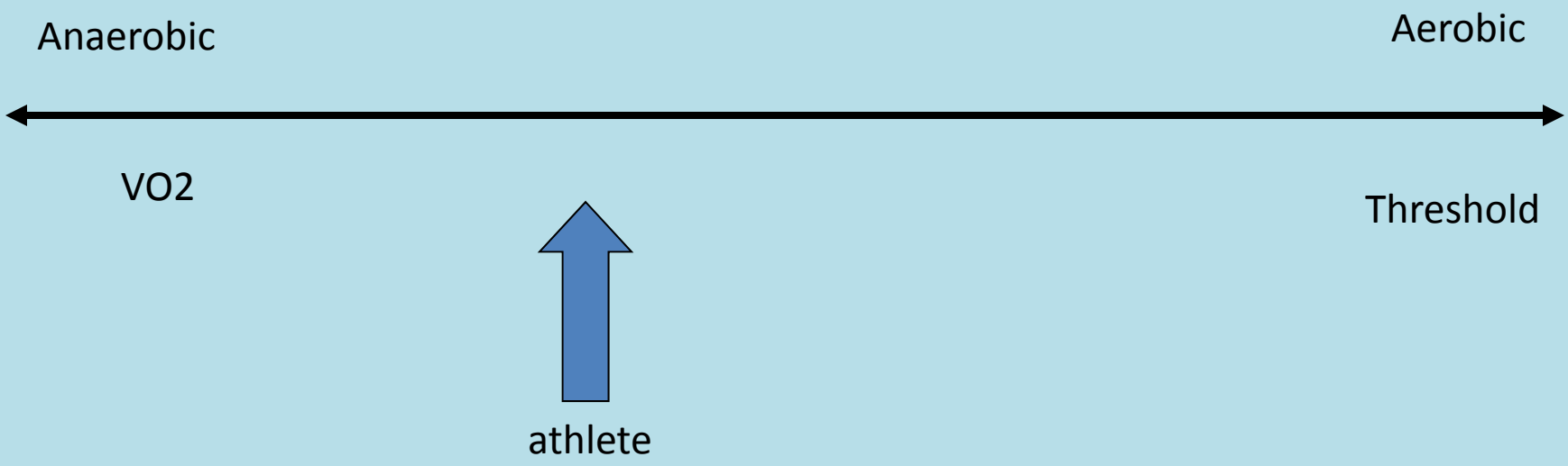


Danger Zone

Too much emphasis on the anaerobic workouts may lead to injury, iron deficiency, and overtraining.

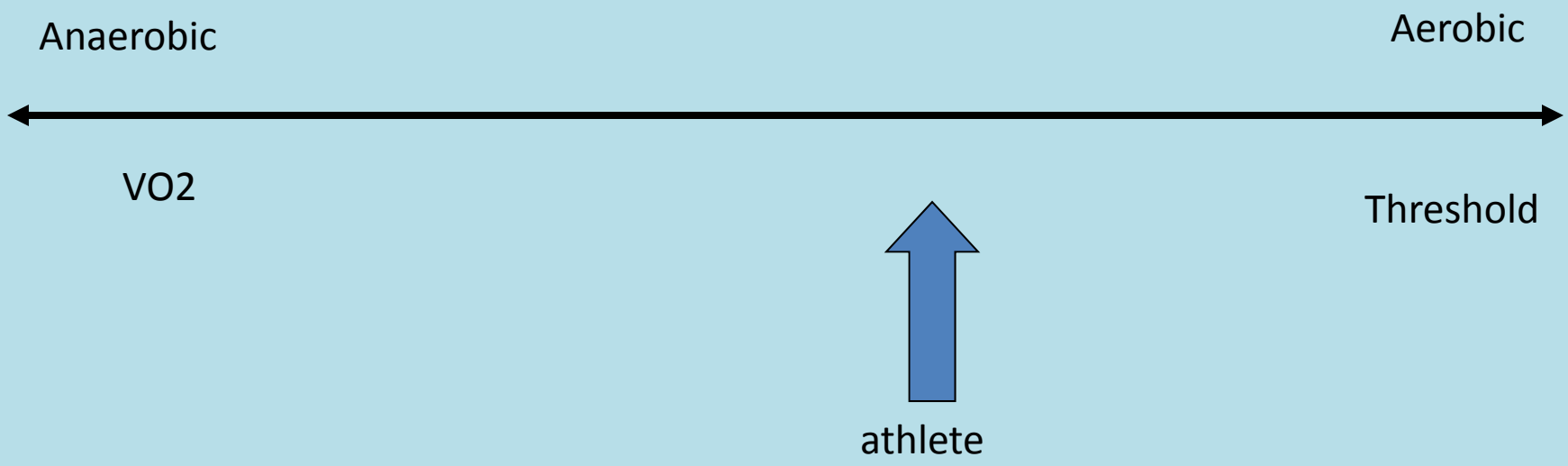
During the season

During the season, the emphasis will be both anaerobic development and the continuation of threshold and tempo. You will skew it toward anaerobic but you never relinquish the aerobic component

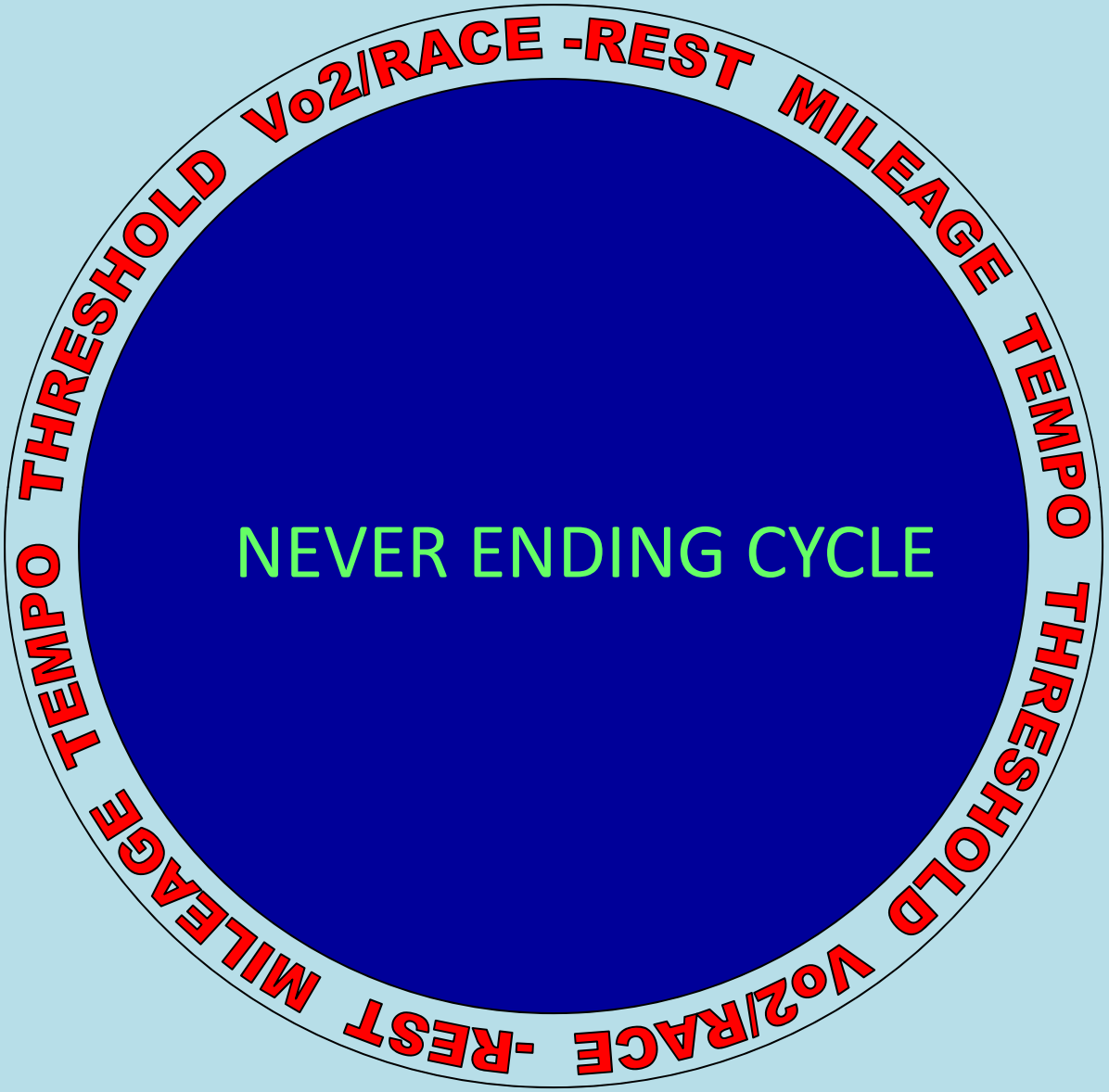


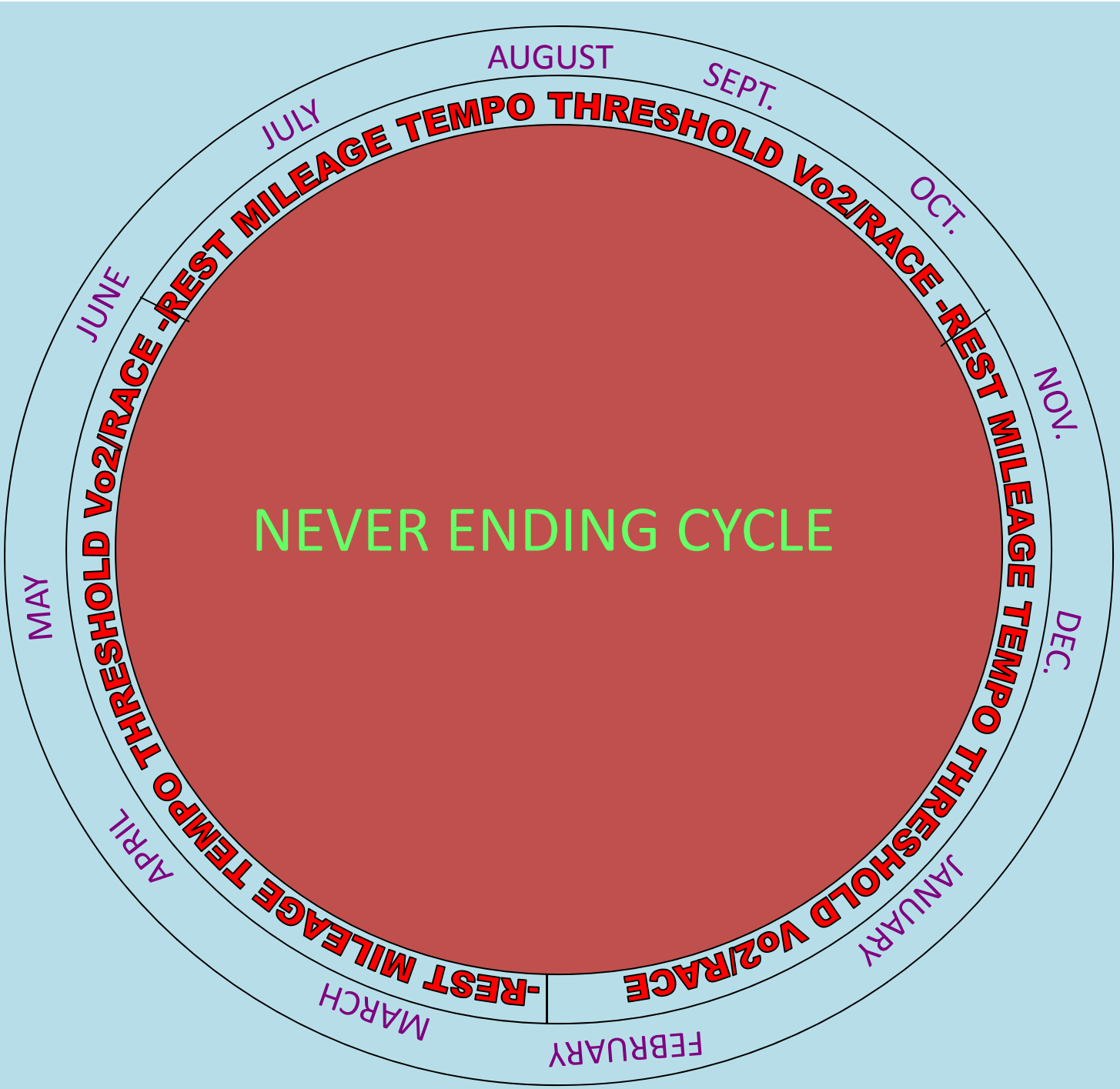
Toward the end of the season

Toward the end of the season – it is not uncommon to skew the training back to Aerobic components and lessening the anaerobic components (at least de-emphasize the harder training) in the effort to preserving the racing form of the athlete




MILEAGE - TEMPO - THRESHOLD - VO2/RACE - REST -
NEVER ENDING CYCLE


NEVER ENDING CYCLE
Vo2/RACE -REST MILEAGE TEMPO THRESHOLD
Vo2/RACE -REST MILEAGE TEMPO THRESHOLD


AUGUST
SEPT.
OCT.
NOV.
DEC.
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
-REST MILEAGE TEMPO THRESHOLD Vo2/RACE
-REST MILEAGE TEMPO THRESHOLD Vo2/RACE
-REST MILEAGE TEMPO THRESHOLD Vo2/RACE
-REST MILEAGE TEMPO THRESHOLD Vo2/RACE
NEVER ENDING CYCLE

Questions & Answers