Athlete
Education
Series

Run Training Utilizing the Daniels' Method: Planning Effective Workouts and Incorporating Track Workouts

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Quick Poll

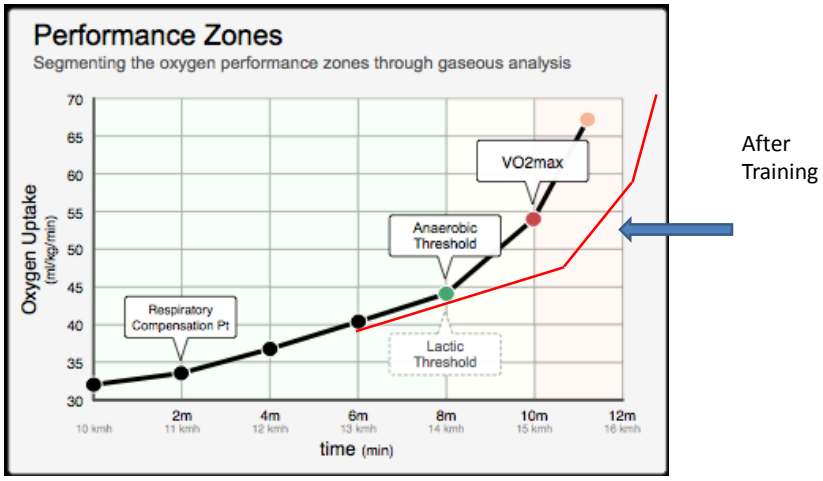
- How many days a week do you run?
- Do you attend GCTri track workouts? Why/why not?
- Do you think its more important to get your mileage in or is it about quality workouts?
- What technique do you use currently to guide pace?

Why we train…

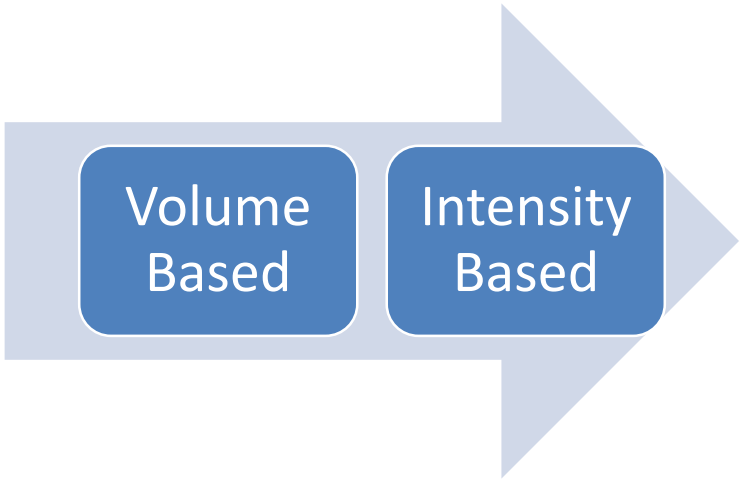
Adaptations to Endurance Training	
Respiratory	Ehhanced O_2 exchange in lungs Improved blood flow through lungs Decreased submaximal respiratory rate Decreased submaximal pulmonary ventilation
Cardiovascular	Increased cardiac output Increased blood volume, red blood cell count and hemoglobin concentration Enhanced blood flow to skeletal muscle Reduced submaximal heart rate Improved thermoregulation
Musculoskeletal	Increased mitochondrial size and density Increased oxidative enzyme concentrations Increased myoglobin concentrations Increased capillarization in muscle bed Increased O_2 difference between arterial and venous blood

From Essentials of Strength Training & Conditioning (2000)

Training will improve Anaerobic threshold and VO2max



Paradigm Shift in Triathlon Training



Measures of Intensity (Running)

- RPE
  - Purely by "feel"
- Heart Rate (Zones)
  - Remember- HR's lag or may stay elevated (difficult for interval or track work)
- Pace (ie – 7:30/mile)
  - Time based

Daniels' vs. HR Zones

These are your paces for each training zone.
Note: Pace is time per distance

Training Zone:	Pace
E Easy Pace HR: 65-79% Qty: lesser of 25% weekly milage or 150 min	km: 6:27 mile: 10:23
M Marathon Pace HR: 80-90% Qty: lesser of 90 min or 16 miles	mile: 8:57
T Threshold Pace HR: 88-92% Qty: lesser of 10% weekly milage or 60 min Why the 0.68 mile distance? See **NOTES** below.	400m: 02:05 800m: 04:10 1000m: 05:12 .68 mile 05:41 mile: 08:22
I Interval Pace HR: 98-100% Qty: 8% weekly milage Why the 0.68 mile distance? See **NOTES** below.	400m: 01:54 1000m: 04:48 .68 mile - 1200m: - mile:
R Repetition Pace	200m: 53 400m: 1:48

Zone	What it does	% of Heart Rate Reserve	Heart rate beats per min
Long, slow runs, easy or recovery runs	Training in this zone improves the ability of your heart to pump blood and improve the muscles' ability to utilize oxygen. The body becomes more efficient at feeding the working muscles, and learns to metabolise fat as a source of fuel.	60-70%	139 – 152
Aerobic zone or "target heart rate zone"	Most effective for overall cardiovascular fitness. Increases your cardio-respitory capacity: that is, the your ability to transport oxygenated blood to the muscle cells and carbon dioxide away from the cells. Also effective for increasing overall muscle strength.	70-80%	152 – 166
Anaerobic zone	The point at which the body cannot remove lactic acid as quickly as it is produced is called the lactate threshold or anaerobic threshold. It generally occurs at about 80-88% of the Heart Rate Reserve. Training in this zone helps to increase the lactate threshold, which improves performance. Training in this zone is hard: your muscles are tired, your breathing is heavy.	80-90%	166 – 179
VO2 max "Red line zone"	You should only train in this zone if you re very fit, and only for very short periods of time. Lactic acid develops quickly as you are operating in oxygen debt to the muscles The value of training in this zone is you can increase your fast twitch muscle fibers which increase speed.	90-100%	179 – 192

They are similar in nature, however Daniels' method is less conservative

The Basics

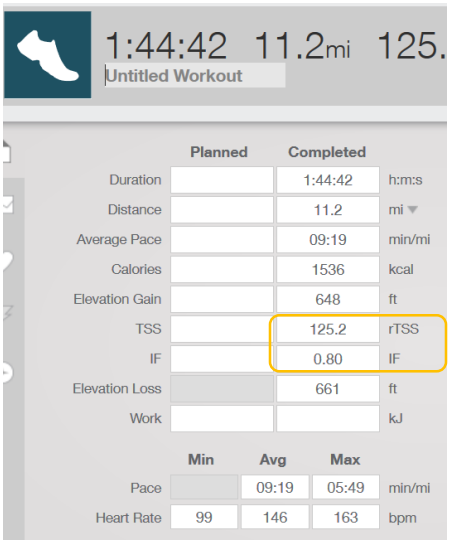
- Good training intensity (pace) is performed just at the edge of anaerobic threshold –
- **STAY AEROBIC**
- If you work beyond anaerobic threshold
  - You won't be able to hold that pace for too long (body physiologically can't keep up)
  - Signs that you've done this:
    - Uncontrolled breathing
    - "Stitch" in your right side (Liver unable to buffer lactic acid)
    - Heavy legs (lactic acid)

Daniels' Method vs. HR Zone Method

- Requires a watch (GPS watch preferred)
- Uses recent run ***performance*** times to help guide running intensity (velocity)
- Never have to worry about HR lag or HR staying elevated

- Requires a GPS watch with HR monitor
- Uses ***feedback from body*** (heart rate) to help guide running intensity (velocity)
- Useful for helping the **overachiever** to ease up if the body is tired and not responding during training and motivating the **underachiever**

Keep your HR monitors!!!

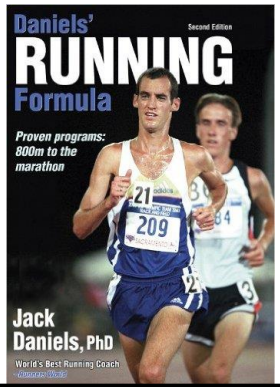


- Runs without HR won't give you rTSS or IF in TrainingPeaks (both important measures to be sure you aren't OVERTRAINING).

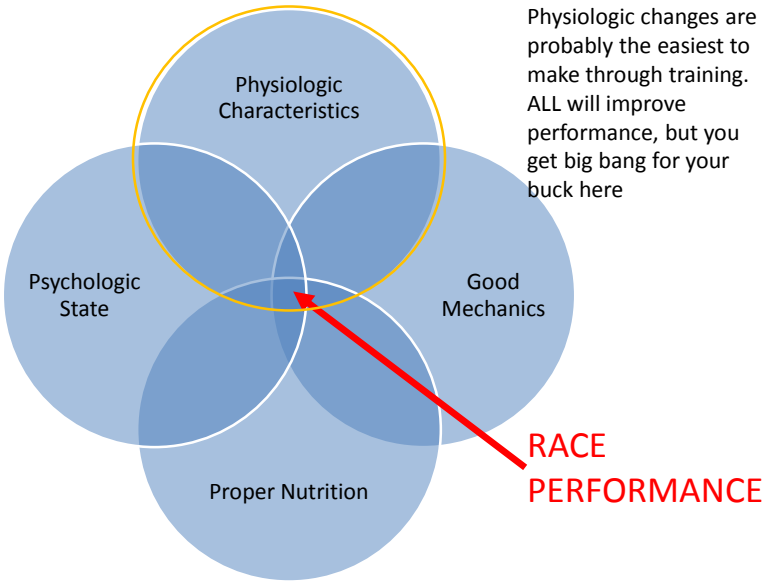
- rTSS – Training Stress Score
- IF – Intensity Factor

Jack Daniels' Method

- http://runsmartproject.com/coaching/dr-jack-daniels/
- V-Dot Calculator (IOS & Android apps) - FREE



Why Use Daniels' Method?



Physiologic changes are probably the easiest to make through training. ALL will improve performance, but you get big bang for your buck here

V-dot

- V-dot = critical velocity
  - Maximal velocity an individual can produce in a certain running event
  - Takes into account ***RECENT*** race *performances*
- VO2max = aerobic capacity
  - Maximal volume of O2 the body can consume and use
  - Takes into account the body's physiologic limit to perform

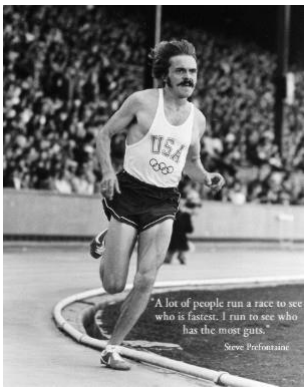
Performance = physiological + psychological + biomechanical

VO2max Records

86.0	Thor Hushovd	cycling	listed in an article on www.fasterskier.com.
86.0	Ole Einar Bjœrndalen	biathlon	listed in an article on www.fasterskier.com.
85.0	Dave Bedford	runner	10k world record holder
85.0	John Ngugi	distance runner	World XC Champion
84.4	Steve Prefontaine	runner	from the US
84.0	Lance Armstrong	cycling	professional cyclist
83.5	Mark Walters	cycling	a pro-cyclist, former Navigators team member, won Philadelphia. This score was from the peak of his career. (personal communication, heard first hand from Mark himself)
83.0	Jens Arne Svartedal	cross country skier	achived 2005, listed in an article on www.fasterskier.com.
82.7	Gary Tuttle	US runner	
82.0	Kip Keino	runner	Olympic 1500 champion
81.1	Craig Virgin	distance runner	twice World cross country champ
81.0	Jim Ryun	runner	US miler WR holder
80.9	Øyvind Leonhardsen	Norwegian professional soccer player	listed in an article on www.fasterskier.com.
80.1	Steve Scott	runner	US miler 3:47

Why V-dot?

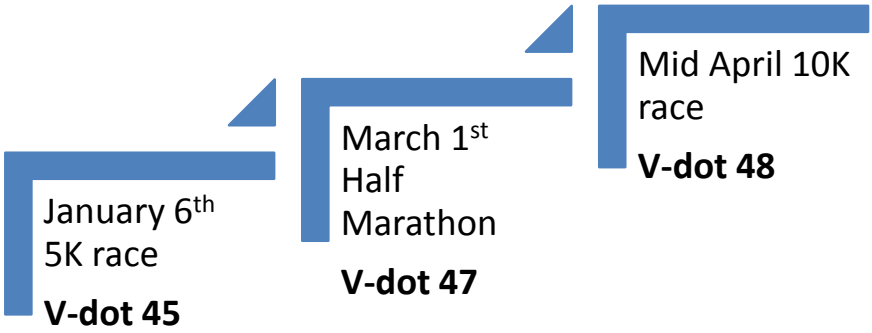
- Why doesn't the guy with the biggest VO2max always win the race????
- Runners routinely perform past their anaerobic threshold
- "I'm going to work so that it's a pure guts race at the end, and if it is, I am the only one who can win it."
  -Steve Prefontaine
- VO2max = 84ml/kg/min



VDOT Calculator

- VDOT is a measure of your current running ability
- Developed by legendary track coach Jack Daniels
- An excellent resource is the book:
  - Daniels' Running Formula

V-dot in Practice



You should be making progress every 4-6 weeks. If no race on calendar you will have to simulate a 5k race or something. At that time – adjust to the new training paces. If you aren't seeing your V-dot improving – you're doing it wrong

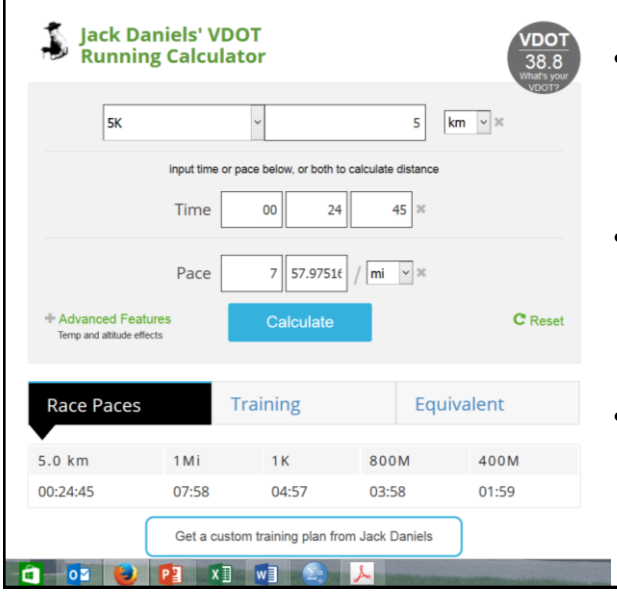
GCTri Track workouts

- GCTri Track Pacing
  - 10K pace
  - 5 K pace
  - Mile pace
  - Sprint
- Daniels' Pacing
  - Easy Pace
  - Marathon Pace
  - Threshold Pace
  - Interval Pace
  - Repetition Pace
  - Remember you get customized numbers based on the distances so it's pretty easy

Track Basics

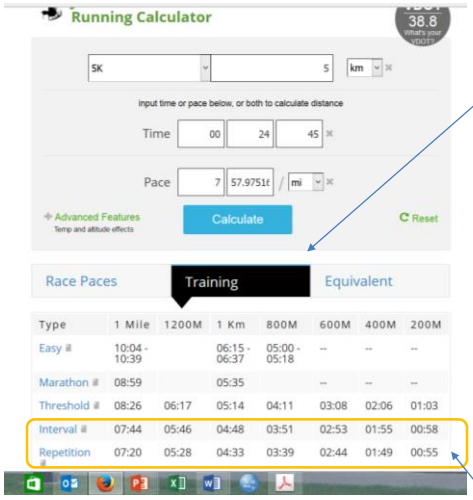
- ¼ lap = 100m
- ½ lap = 200m
- 1 lap = 400m = ¼ mile
- 2 lap = 800m = ½ mile
- 4 lap = 1600m = 1 mile

Example



- You just ran a 5k in 24:45 for a pace of 7:57
- If track workout told you to run 400m @ 5k pace
- You would aim for 2:00 for a lap

Example

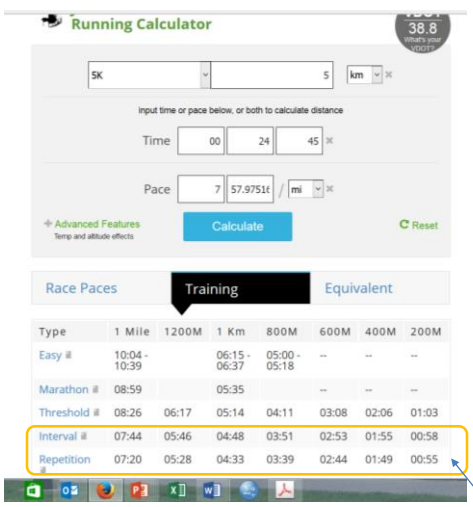


Notice we switched to "Training" Tab

- Workout says 4 x Mile repeats
- You will aim for 7:44 for each of the miles (or ~1:55 sec each lap)

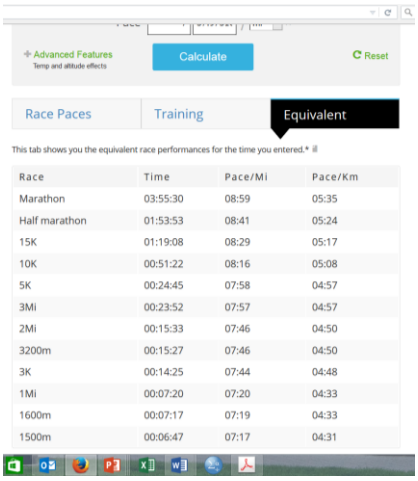
Remember Track is all about Interval & Repetition Work

Example



- WARNING
  - Do not type in the time that you WANT to achieve or your v-dot will be too high and your projected training times will put you in an anaerobic zone which is not beneficial

Cool Extras



Race	Time	Pace/Mi	Pace/Km
Marathon	03:55:30	08:59	05:35
Half marathon	01:53:53	08:41	05:24
15K	01:19:08	08:29	05:17
10K	00:51:22	08:16	05:08
5K	00:24:45	07:58	04:57
3Mi	00:23:52	07:57	04:57
2Mi	00:15:33	07:46	04:50
3200m	00:15:27	07:46	04:50
3K	00:14:25	07:44	04:48
1Mi	00:07:20	07:20	04:33
1600m	00:07:17	07:19	04:33
1500m	00:06:47	07:17	04:31

- Notice we switched to "Equivalent" tab
- I love having a really good idea on how I should perform in a race (remember v-dot takes into account if you are the overachiever or underachiever)
- All based on logistic regression (geeky math). Notice how the 10K time isn't just double the 5k time

Daniels' Method & RJ's Philosophy

- If you look at Daniels Marathon & Half Marathon training plans you will likely train 5-6 days per week
- HOWEVER – he points out that the Q1 and Q2 (Q = quality) workouts are most important
- The Q workouts are performed at high intensity (get bang for your buck – shift your anaerobic threshold further to the right)
- We are busy trying to train on the bike & swim and balance work and families
- 3 Workouts/week is perfect – Q1 (***GCTri Track!!!***), Q2 (Tempo on your own), Long Run (with or without friends)

Run with PURPOSE!!!

- Don't just run to run, know WHY you are doing it.
- Q1 & Q2:
  - Work at threshold pace to improve aerobic fitness (training adaptations)
  - Get body used to going faster
- Long Runs:
  - Put the miles on the legs so they are used to that amount of stress

Differences between Q1 & Q2

- Q1 – Think *intervals at threshold*
  - GCTri Track workouts are perfect for this. Coach Mike does a great job of mixing up distances and recoveries which keeps it from getting monotonous
- Q2 – Think *tempo run*
  - Run close to planned race pace but throw in some pick ups that are regularly planned (remember challenge your body)

Run Pacing Table for Track Workouts

Mile	100m	200m	300m	400m	500m	600m	800m	1000m	1200m	1600m	2000m	2400m	3000m	3200m	5000m	10000m
4:00	00:14.9	00:29.8	00:44.7	00:59.7	01:14.5	01:29.5	01:59.3	02:29.1	02:59.0	03:58.6	04:58.3	05:57.9	07:27.4	07:57.2	12:25.7	24:51.3
4:10	00:15.5	00:31.1	00:46.6	01:02.1	01:17.6	01:33.2	02:04.3	02:35.3	03:06.4	04:08.6	05:10.7	06:12.8	07:46.0	08:17.1	12:56.7	25:53.5
4:20	00:16.1	00:32.3	00:48.5	01:04.6	01:20.8	01:36.9	02:09.2	02:41.6	03:13.9	04:18.5	05:23.1	06:27.7	08:04.7	08:37.0	13:27.8	26:55.6
4:30	00:16.8	00:33.6	00:50.3	01:07.1	01:23.9	01:40.7	02:14.2	02:47.8	03:21.3	04:28.4	05:35.5	06:42.7	08:23.3	08:56.9	13:58.9	27:57.7
4:40	00:17.4	00:34.8	00:52.2	01:09.6	01:27.0	01:44.4	02:19.2	02:54.0	03:28.8	04:38.4	05:48.0	06:57.6	08:42.0	09:16.8	14:29.9	28:59.9
4:50	00:18.0	00:36.0	00:54.0	01:12.1	01:30.1	01:48.1	02:24.2	03:00.2	03:36.2	04:48.3	06:00.4	07:12.5	09:00.6	09:36.6	15:01.0	30:02.0
5:00	00:18.6	00:37.3	00:55.9	01:14.6	01:33.2	01:51.8	02:29.1	03:06.4	03:43.7	04:58.3	06:12.8	07:27.4	09:19.2	09:56.5	15:32.1	31:04.2
5:10	00:19.2	00:38.5	00:57.8	01:17.1	01:36.3	01:55.6	02:34.1	03:12.6	03:51.2	05:08.2	06:25.3	07:42.3	09:37.9	10:16.4	16:03.2	32:06.3
5:20	00:19.9	00:39.8	00:59.6	01:19.5	01:39.4	01:59.3	02:39.1	03:18.8	03:58.6	05:18.2	06:37.7	07:57.2	09:56.5	10:36.3	16:34.2	33:08.4
5:30	00:20.5	00:41.0	01:05.1	01:22.0	01:42.5	02:03.0	02:44.0	03:25.1	04:06.1	05:28.1	06:50.1	08:12.1	10:15.2	10:56.2	17:05.3	34:10.6
5:40	00:21.1	00:42.3	01:03.4	01:24.5	01:45.6	02:06.8	02:49.0	03:31.3	04:13.5	05:38.0	07:02.5	08:27.1	10:33.8	11:16.1	17:36.4	35:12.7
5:50	00:21.7	00:43.5	01:05.2	01:27.0	01:48.7	02:10.5	02:54.0	03:37.5	04:21.0	05:48.0	07:15.0	08:42.0	10:52.5	11:36.0	18:07.4	36:14.9
6:00	00:22.3	00:44.7	01:07.1	01:29.5	01:51.8	02:14.2	02:59.0	03:43.7	04:28.4	05:57.9	07:27.4	08:56.9	11:11.1	11:55.8	18:38.5	37:17.0
6:10	00:23.0	00:46.0	01:08.9	01:32.0	01:54.9	02:17.9	03:03.9	03:49.9	04:35.9	06:07.9	07:39.8	09:11.8	11:29.7	12:15.7	19:09.6	38:19.1
6:20	00:23.6	00:47.2	01:10.8	01:34.5	01:58.0	02:21.7	03:08.9	03:56.1	04:43.4	06:17.8	07:52.3	09:26.7	11:48.4	12:35.6	19:40.6	39:21.3
6:30	00:24.2	00:48.5	01.12.7	01:36.9	02:01.1	02:25.4	03:13.9	04:02.3	04:50.8	06:27.7	08:04.7	09:41.6	12:07.0	12:55.5	20:11.7	40:23.4
6:40	00:24.8	00:49.7	01:14.5	01:39.4	02:04.3	02:29.1	03:18.8	04:08.6	04:58.3	06:37.7	08:17.1	09:56.5	12:25.7	13:15.4	20:42.8	41:25.6
6:50	00:25.5	00:51.0	01:16.4	01:41.9	02:07.4	02:32.9	03:23.8	04:14.8	05:05.7	06:47.6	08:29.5	10:11.4	12:44.3	13:35.3	21:13.8	42:27.7
7:00	00:26.1	00:52.2	01:18.3	01:44.4	02:10.5	02:36.6	03:28.8	04:21.0	05:13.2	06:57.6	08:42.0	10:26.4	13:02.9	13:55.1	21:44.9	43:29.8
7:10	00:26.7	00:53.4	01:20.1	01:46.9	02:13.6	02:40.3	03:33.8	04:27.2	05:20.6	07:07.5	08:54.4	10:41.3	13:21.6	14:15.0	22:16.0	44:32.0
7:20	00:27.3	00:54.7	01:22.0	01:49.4	02:16.7	02:44.0	03:38.7	04:33.4	05:28.1	07:17.5	09:06.8	10:56.2	13:40.2	14:34.9	22:47.1	45:34.1
7:30	00:27.9	00:55.9	01:23.9	01:51.8	02:19.8	02:47.8	03:43.7	04:39.6	05:35.5	07:27.4	09:19.2	11:11.1	13:58.9	14:54.8	23:18.1	46:36.2
7:40	00:28.6	00:57.2	01:25.7	01:54.3	02:22.9	02:51.5	03:48.7	04:45.8	05:43.0	07:37.3	09:31.7	11:26.0	14:17.5	15:14.7	23:49.2	47:38.4
7:50	00:29.2	00:58.4	01:27.6	01:56.8	02:26.5	02:55.2	03:53.6	04:52.1	05:50.5	07:47.3	09:44.1	11:40.9	14:36.2	15:34.6	24:20.3	48:40.5
8:00	00:29.8	00:59.7	01:29.5	01:59.3	02:29.1	02:59.0	03:58.6	04:58.3	05:57.9	07:57.2	09:56.5	11:55.8	14:54.8	15:54.5	24:51.3	49:42.7

This is on GCTri website http://www.gctri.org/wp-content/uploads/2014/06/run-pacing-chart-track.pdf

In Conclusion

- You NEED to bring a watch to track workouts & let v-dot guide your pace!!!
- Always run with people who are your pace
- Track workouts will improve your cardiovascular fitness - > you will get faster
- You should also be including at least a long run at (E) pace each week in addition to the track workout.

The Treadmill Cheat Sheet

Speed Conversions, Pace Times and Target Distances

MPH	km/hr	Min/Mi	Min/Km	3 mi	5 km	8 km	10 km	1/2 mar.	Marathon
3.0	4.8	0:20:00	0:12:26	1:00:00	1:02:08	1:39:25	2:04:16	4:22:13	8:44:26
3.2	5.1	0:18:45	0:11:39	0:56:15	0:58:15	1:33:12	1:56:30	4:05:50	8:11:40
3.4	5.5	0:17:39	0:10:58	0:52:56	0:54:50	1:27:43	1:49:39	3:51:22	7:42:44
3.6	5.8	0:16:40	0:10:21	0:50:00	0:51:47	1:22:51	1:43:34	3:38:31	7:17:02
3.8	6.1	0:15:47	0:09:49	0:47:22	0:49:03	1:18:29	1:38:07	3:27:01	6:54:02
4.0	6.4	0:15:00	0:09:19	0:45:00	0:46:36	1:14:34	1:33:12	3:16:40	6:33:20
4.2	6.8	0:14:17	0:08:53	0:42:51	0:44:23	1:11:01	1:28:46	3:07:18	6:14:36
4.4	7.1	0:13:38	0:08:28	0:40:55	0:42:22	1:07:47	1:24:44	2:58:47	5:57:34
4.6	7.4	0:13:03	0:08:06	0:39:08	0:40:31	1:04:50	1:21:03	2:51:01	5:42:01
4.8	7.7	0:12:30	0:07:46	0:37:30	0:38:50	1:02:08	1:17:40	2:43:53	5:27:46
5.0	8.0	0:12:00	0:07:27	0:36:00	0:37:17	0:59:39	1:14:34	2:37:20	5:14:40
5.2	8.4	0:11:32	0:07:10	0:34:37	0:35:51	0:57:21	1:11:42	2:31:17	5:02:34
5.4	8.7	0:11:07	0:06:54	0:33:20	0:34:31	0:55:14	1:09:02	2:25:41	4:51:21
5.6	9.0	0:10:43	0:06:39	0:32:09	0:33:17	0:53:16	1:06:35	2:20:28	4:40:57
5.8	9.3	0:10:21	0:06:26	0:31:02	0:32:08	0:51:25	1:04:17	2:15:38	4:31:16
6.0	9.7	0:10:00	0:06:13	0:30:00	0:31:04	0:49:43	1:02:08	2:11:07	4:22:13
6.2	10.0	0:09:41	0:06:01	0:29:02	0:30:04	0:48:06	1:00:08	2:06:53	4:13:46
6.4	10.3	0:09:22	0:05:50	0:28:07	0:29:08	0:46:36	0:58:15	2:02:55	4:05:50
6.6	10.6	0:09:05	0:05:39	0:27:16	0:28:15	0:45:11	0:56:29	1:59:11	3:58:23
6.8	10.9	0:08:49	0:05:29	0:26:28	0:27:25	0:43:52	0:54:50	1:55:41	3:51:22
7.0	11.3	0:08:34	0:05:20	0:25:43	0:26:38	0:42:36	0:53:16	1:52:23	3:44:46
7.2	11.6	0:08:20	0:05:11	0:25:00	0:25:53	0:41:25	0:51:47	1:49:15	3:38:31
7.4	11.9	0:08:06	0:05:02	0:24:19	0:25:11	0:40:18	0:50:23	1:46:18	3:32:37
7.6	12.2	0:07:54	0:04:54	0:23:41	0:24:32	0:39:15	0:49:03	1:43:30	3:27:01
7.8	12.6	0:07:42	0:04:47	0:23:05	0:23:54	0:38:14	0:47:48	1:40:51	3:21:42
8.0	12.9	0:07:30	0:04:40	0:22:30	0:23:18	0:37:17	0:46:36	1:38:20	3:16:40
8.2	13.2	0:07:19	0:04:33	0:21:57	0:22:44	0:36:22	0:45:28	1:35:56	3:11:52
8.4	13.5	0:07:09	0:04:26	0:21:26	0:22:12	0:35:30	0:44:23	1:33:39	3:07:18
8.6	13.8	0:06:59	0:04:20	0:20:56	0:21:41	0:34:41	0:43:21	1:31:28	3:02:57
8.8	14.2	0:06:49	0:04:14	0:20:27	0:21:11	0:33:54	0:42:22	1:29:24	2:58:47
9.0	14.5	0:06:40	0:04:09	0:20:00	0:20:43	0:33:08	0:41:25	1:27:24	2:54:49
9.2	14.8	0:06:31	0:04:03	0:19:34	0:20:16	0:32:25	0:40:31	1:25:30	2:51:01
9.4	15.1	0:06:23	0:03:58	0:19:09	0:19:50	0:31:44	0:39:40	1:23:41	2:47:22
9.6	15.4	0:06:15	0:03:53	0:18:45	0:19:25	0:31:04	0:38:50	1:21:57	2:43:53
9.8	15.8	0:06:07	0:03:48	0:18:22	0:19:01	0:30:26	0:38:03	1:20:16	2:40:33
10.0	16.1	0:06:00	0:03:44	0:18:00	0:18:38	0:29:50	0:37:17	1:18:40	2:37:20
10.2	16.4	0:05:53	0:03:39	0:17:39	0:18:17	0:29:14	0:36:33	1:17:07	2:34:15
10.4	16.7	0:05:46	0:03:35	0:17:18	0:17:55	0:28:41	0:35:51	1:15:38	2:31:17
10.6	17.1	0:05:40	0:03:31	0:16:59	0:17:35	0:28:08	0:35:10	1:14:13	2:28:26
10.8	17.4	0:05:33	0:03:27	0:16:40	0:17:16	0:27:37	0:34:31	1:12:50	2:25:41
11.0	17.7	0:05:27	0:03:23	0:16:22	0:16:57	0:27:07	0:33:54	1:11:31	2:23:02
11.2	18.0	0:05:21	0:03:20	0:16:04	0:16:39	0:26:38	0:33:17	1:10:14	2:20:28
11.4	18.3	0:05:16	0:03:16	0:15:47	0:16:21	0:26:10	0:32:42	1:09:00	2:18:01
11.6	18.7	0:05:10	0:03:13	0:15:31	0:16:04	0:25:43	0:32:08	1:07:49	2:15:38
11.8	19.0	0:05:05	0:03:10	0:15:15	0:15:48	0:25:17	0:31:36	1:06:40	2:13:20

Questions

- Email me: rboergers@Hotmail.com
- Online Resources:
  - https://runsmartproject.com/calculator/
- The Book
  - http://www.amazon.com/Daniels-Running-Formula-3rd-Edition-Jack/dp/1450431836