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POWER-TIME-WEIGHT COMPARISONS

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The following table compares average power in watts to 40 km time trial times on a flat course for three hypothetical riders of different **combined** bike and body weights. For example, if your lactate test reveals you produce 210 watts at a HR of 155bpm and you plan to hold that HR/perceived level of effort for a 40km time trial and your weight is 160 and your bike weighs 20 pounds, you would average approximately 20.8 mph and cover the course in approximately 1:11:40. Keep in mind these are only estimates and exact times will be influenced by the course, weather conditions, aerodynamics, etc.

	120	Pounds	150	Pounds	180	Pounds
Watts	Time	Speed	Time	Speed	Time	Speed
150	1:18:21	19.0	1:20:28	18.5	1:21:56	18.2
160	1:17:32	19.2	1:18:22	19.0	1:20:29	18.5
170	1:16:07	19.6	1:17:24	19.2	1:18:22	19.0
180	1:13:31	20.3	1:14:16	20.1	1:16:09	19.6
190	1:12:24	20.6	1:13:32	20.3	1:14:18	20.0
200	1:11:37	20.8	1:12:27	20.6	1:13:33	20.2
210	1:09:41	21.4	1:10:21	21.2	1:11:40	20.8
220	1:08:41	21.7	1:09:44	21.4	1:10:23	21.2
230	1:08:07	21.9	1:08:07	21.9	1:09:45	21.3
240	1:06:24	22.4	1:06:58	22.2	1:08:11	21.8
250	1:05:30	22.7	1:0625	22.4	1:07:00	22.2
260	1:04:59	22.9	1:05:32	22.7	1:06:27	22.4
270	1:03:27	23.5	1:03:58	23.3	1:05:04	22.9
280	1:02:38	23.8	1:03:29	23.5	1:04:00	23.3
290	1:02:10	23.9	1:02:46	23.7	1:03:31	23.4
300	1:00:50	24.5	1:01:21	24.3	1:02:21	23.9
310	1:00:07	24.8	1:00:54	24.4	1:01:23	24.3
320	59:56	24.8	1:00:42	24.5	1:01:11	24.3
330	58:39	25.4	59:34	25.0	1:00:02	24.8
340	58:19	25.5	58:46	25.3	59:41	24.9

350	57:40	25.8	58:23	25.5	58:47	25.3
360	57:08	26.1	57:33	25.9	58:15	25.6
370	56:24	26.4	57:14	26.0	57:40	25.8
380	56:03	26.6	56:27	26.4	57:18	26.0
390	55:21	26.9	55:56	26.6	56:21	26.4
400	55:01	27.0	55:24	26.9	56:03	26.6

So now that you know how watts equate to riding on the flats, how do you determine power output for a hilly race you have coming up? The following is a simple formula for the power required to climb hills. It is quite accurate for speeds less than 10mph (i.e. steep hills or long rides/races), when wind resistance and rolling resistance are not very significant:

Power (watts) = 2 X Weight (lb) X Speed (mph) X Gradient (as a fraction)

Suppose you still weigh 180 pounds with your bike and you want to average 10 mph up a 7% grade hill. Using the formula above:

2 X 180 lbs. X 10 mph X .07 (gradient) = 252 watts

Suppose you live in Virginia Beach and don’t have any hills to train on but want to prepare for a hilly time trial. Referring back to the chart above, you would have to hold a speed of approximately 22.2mph on the flats of Pungo to simulate riding up the 7% grade hill at 10 mph.