

Estimating Target Heart Rates:

"The Karvonen Formula"

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The Karvonen Formula is more accurate for estimating target heart rate (THR) intensity. This method factors not just maximum heart rate and aerobic capacity (VO₂ max), but the resting heart rate as well; thus, one can estimate the actual heart rate reserve (HRR) that is present for increasing cardiac output. When using the 220-age formula only, optimal heart rate intensity can be over estimated by ≈10-15%. For example, if target intensity was 65% of maximum heart rate (max HR) with the basic formula only, then this 10-15% margin of error would place one well below the 65% of max HR needed for optimal fitness improvements.

To estimate your target heart rate (THR) you need the following:

1. **Resting Heart Rate: (RHR)** Take your resting pulse on three different mornings *before rising* from bed. Add the three readings and divide by three to get an average heart rate value.
2. **Max Heart Rate: (max HR)** Use the basic 220-age formula.

The Karvonen Formula

$$\text{THR} = (\text{Max HR} - \text{RHR}) \times \text{Desired Intensity \%} + \text{RHR}$$

THR=Target Heart Rate

HRR=Heart Rate Reserve

RHR=Resting Heart Rate

BPM=Beats per Minute

- ♥ **Example:** What is the target heart rate (THR) for a 40 year old with a resting heart rate (RHR) of 80 beats per minute (BPM) who wants to exercise at a 70% intensity level?

220-40=180 ("predicted" max HR)

180 (max HR)

-80 (RHR)

100 (HRR)

x.70 (desired intensity of training)

70

+80 (RHR)

150 (Target Heart Rate BPM at 70% of HRR) *Also estimate for 50, 65, 75, 85, & 90+% of HRR

- ♥ Note that the 220-age formula for MHR is an approximate estimate that can vary up to 12-24 BPM depending upon age, fitness level, genetics, etc. For an "exact" max HR, a supervised *functional capacity test* or *stress test* should be performed.
- ♥ If your RHR is elevated on any given day, this can be an indication of overtraining without sufficient rest or other types of physical and/or psychological problems that can compromise your central nervous system. Listen to your body and either take a day of rest or exercise at a lower intensity until your RHR returns to normal.
- ♥ **More is not always better with heart rate training!** For example, if you push above 85-90% VO₂ max (maximum aerobic capacity for utilizing oxygen) to the point of being anaerobic (cannot provide sufficient oxygen to muscle tissues) for more than 2-4 minutes, you will be unable to continue with a quality effort due to severe lactate build up and lowering of blood and muscle pH. Proper anaerobic interval training (high intensity efforts of 85-90+%) always necessitates short rest periods in-between the intervals which allow for lower heart rates and aerobic recovery from efficient diaphragmatic breathing which re-oxygenates the body.

* Ron Jones (9.5.07)