Using Heart Max Rate to Determine Exercise Intensity

Summary: A conditioned heart beats much less at rest, only 40 to 50 beats per minute or even less and less at workloads compared to someone who is unconditioned. You can see yourself improving from exercise if your heart rate is lower at the same workloads that you were previously doing - it is a sign that you heart is more efficient. Another good sign of heart efficiency is if your recovery heart rate is quicker after exercise. **Fast Recovery Heart Rate is a good thing.** Heart rate should be able to drop 18 beats within first minute of exercise recovery after vigorous exercise.

Heart rate at somewhat hard intensity was 136 bpm. Divide by .7. Estimated Max=194. Target heart rate zone 116-136., which is 60-70% of estimated maximum

Many fitness professional use target heart rate zones to train in, which is based off of percentages of maximum heart rate. This is a good strategy **ONLY** if using a true measure of maximum heart rate. Equations like (220 minus age) are widely inaccurate. I typically find what someones heart rate is at a Somewhat Hard to Hard intensity and divide that heart rate by (.70) to get what I feel is a better estimate of their maximum heart rate. From there I take that number and multiply it by .60 and .70 to find a target heart rate range to train in (Base Training 60 to 70% of maximum). When they get fitter I have them do HIIT where they train at 80 to 90% of maximum for some intervals (anaerobic zone). See example above. Use estimated maximum in the calculator (see calculator). **Read on for more details**

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Like METS, Talking and Breathing Test, RPE, and Watts heart rate is used to judge exercise intensity. It is probably the most widely used since many people have Apple Watches and fit bits that give a measure of heart rate. I typically do not measure heart rate much with the exception when testing to determine aerobic status and improvement. I rather use the Talk Test and RPE when judging intensity since they are a perception of how hard you are working and that heart rate can be very variable.

When performing light to moderate exercise your heart rate increases as your work rate increases at a somewhat linear rate.This ensures that blood gets to the muscles so that they can get the oxygen and nutrients they need to continue working. There is a limit to heart rate, know as maximum heart rate, and when approaching it heart rate plateaus. Many governing fitness bodies suggest for healthy adults train within a percentage of this maximum, which is typically 50 to 80 % (lower and higher limit). **This is typically a good suggestion for most, but the problem is that many people use an estimated maximum heart rate to figure out their heart range. Typically used is the old standard equation of 220 minus age. This is problematic since this equation has a ± 20 to 30 beats error of estimate.** There are many new maximum new heart rate formulas to choose from. One used by ACE is 208 minus (.7 * age). Garmin calculate max heart rate by subtracting your age from 220 for males and 226 for females. However, all of these are only an estimates based on population averages and they sit have high estimation errors. **The only way to know your true max heart rate is to therefore measure it. This can be problematic since you need to push yourself to a maximum level for one or more minutes. This might be too much for most especially those new to fitness. Since estimated maximum heart rate is correlated to RPE (see chart) I typically find what someones heart rate is at a Somewhat Hard to Hard intensity and divide that heart rate by (.70) to get what I feel is a better estimate of their maximum heart rate. So if you had a heart rate at a RPE of 4-5 of 130 beat per minute I would suggest using a estimated maximum heart rate of 185. I would then have you train in a range of 110 to 140 beats per minute, which is roughly 60 to 75 % of estimated maximum.**

RPE	Talking	Breathing	Est Max Heart Rate %	%VO Max
1	Normal	Normal	40	35
2	Normal	Normal	50	45
3 Moderate	Easy	Comfortable	60	55
4 VT-1 Somewhat Hard	Somewhat Difficult	Noticeable	70	65
5-VT2 Hard VT=Lactic acid accumulates, ventilatory threshold	Difficult	Deep but Steady	70-80%	75
6-VT2	Difficult-Very Difficult-Lactic Acid Burn	Deep and Somewhat Rapid	70-80%	85
7-VT3	Very Difficult	Deep and Rapid	80-90%	90
8-VT3	Extremely Difficult	Very Deep and Very Rapid	80-90%	95
9	No	Very Deep and Very Rapid	90-85%	98
10	Impossible	Breathlessness	95-100%	100

WANT MORE DETAILS MAXIMUM HEART RATE - READ ON

USING DIFFERENT MAX HEART RATE EQUATIONS AT 40, 50, 70 YEARS

Example 40 year old male:

Max heart rate form 208 minus (.7 * age) equation = 180
Max heart rate from (220 - age) equation = 180

Example 50 year old male:

Max heart rate form 208 minus (.7 * age) equation = 172
Max heart rate from (220 - age) equation = 170

Example 70 year old male:

Max heart rate form 208 minus (.7 * age) equation = 158
Max heart rate from (220 - age) equation = 150

CAN BE DRAMATICALLY DIFFERENT AS AGE CHANGES

If you are an athlete and are serious about training estimating maximum heart rate should only be a starting point. You should figure out your true maximum or use my calculation as mentioned. Testing to your maximum heart rate can be exhausting and dangerous and should only be done by those who are fit and use to pushing themselves. It can be done after a warm up and then 2 to 3 incremental stages reaching a level that you can only sustain the activity for one to 3 minutes. After finding the heart rate you can slow down to cool down. From here you can put your maximum heart rate into this equation to give you zones to work in - only use if you have been involved in a fitness program (see calculator).

Maximum heart rate can vary significantly from person to person. In fact, high or low Max HR is neither good nor bad. It's just what a person is born with. Maximum heart rate does decrease with age, but not nearly as much as formulas would suggest (especially for fit people). It goes down mostly due to the decreased level of overall activity. In fact, trained athletes don't really see a drop in maximum heart rate until they end their careers and reduce training volume. It's not uncommon to see a 40-year-old athlete with a maximum heart rate of 195 where a formula would suggest only 180 (according to the athlete blog).

The most popular heart rate formulas are:

- **[220 – Age]** – most common and widely used maximum heart rate formula
- **[207 – 0.7 x Age]** – more precise formula, adjusted for people over the age of 40
- **[211 – 0.64 x Age]** – slightly more precise formula, adjusted for generally active people

None of above-mentioned formulas are gender-adjusted. Generally women tend to have a 5-to-10-beat higher maximum HR than men, so that is additional something to account for.

These formulas focus on the 'theoretical' maximum heart rate. The actual maximum heart rate that an athlete can reach will vary across different sports.

For example, running involves more muscles than cycling and overall maximum heart rate tends to be a little higher. At the same time, maximum heart rate while swimming is lower due to a cooler environment and using mostly upper body muscles which are smaller in size. Therefore, it's important to calculate Max HR for a specific sport to be able to set up training zones correctly.

Maximum and target heart rates:

Age (Years Old)	Target Heart Rate Zone, 50-85%	Average Maximum Heart Rate, 100%
20	100-170 bpm	200 bpm
30	95-162 bpm	190 bpm
35	93-157 bpm	185 bpm
40	90-153 bpm	180 bpm
45	88-149 bpm	175 bpm
50	85-145 bpm	170 bpm
55	83-140 bpm	165 bpm
60	80-136 bpm	160 bpm
65	78-132 bpm	155 bpm
70	75-128 bpm	150 bpm

Cleveland Clinic

Source: American Heart Association

THESE ARE JUST ESTIMATES, NEED TO KNOW TRUE MAX HEART RATE

WANT MORE DETAILS
TARGET HEART RATE - READ ON

Exercise heart rate zones are training levels based on your maximum heart rate.

- **Lower-intensity zone (Warm Up):** You're exercising at 50% to 60% of your max heart rate.
- **Temperate zone (Base fitness)::** You're exercising at 60% to 70% of your max heart rate. Roughly 65% of the calories you burn are fat.
- **Aerobic zone:** Working at 70% to 80% of max heart rate puts you in the aerobic zone. About 45% of the calories you burn are fat. But you're burning a higher number of overall calories compared to the other heart rate zones. **Ventilatory Threshold VT1 RESIDES HERE*. A person who is at VT1 can no longer talk comfortably,—but can still string together a few words—while exercising.**
- **Anerobic zone:** Working at 80% to 90% of max heart rate puts you in the Anaerobic capacity zone. **VT2 RESIDES HERE*. Rapid rate of breathing where the exerciser can no longer speak.**
- **Speed zone (Sprint Training):** Working at 90% to 100% of max heart rate. **VT2 RESIDES HERE.**

* Ventilatory threshold marks the point where oxygen delivery to the muscles becomes a limiting factor, and your body is forced to rely more upon its anaerobic energy system. VT 1 MARKS THE POINT WHERE THAT STARTS. As a result, lactate levels start to rise faster than they can be cleared and your blood becomes more acidic. VT2 IS the point that blood lactate accumulates faster than the body can metabolize it. Talking at VT2 will be limited to a few words.