

DETERMINING MAXIMAL HEART RATE

Name: _____ Date: _____ Ambient heart rate: _____

Maximal heart rate (MHR) is the fastest your heart can beat in one minute; thus, it is measured in beats per minute (bpm).

Your MHR is unique to you, just like your fingerprints, and is based on many factors. The variation between any two people's MHRs can be large. We know that MHR cannot be increased with training.

To get as accurate a measurement as possible, perform the following six submaximal heart rate tests and then use the results to estimate your MHR.

For all of these measures, be sure to warm up fully before beginning.

1-Mile (1.6 km) Walking Test

On a school or city track, walk or stride as fast as your current fitness level will allow. That is, walk (or stride, or run) four continuous laps at a brisk yet comfortable pace. The last lap is the important one; the first three laps get your heart rate to plateau.

Instructions

1. Put on your heart rate monitor and get a reading. (If you have the record option on your monitor, set it.)
2. Walk slowly to warm up at first; then gradually increase your speed.
3. Walk four continuous laps, walking the last lap as briskly as you can. Note your heart rate as you start your fourth lap.
4. After the last lap, look at your heart rate monitor and mentally estimate your average heart rate for this lap.
5. After you have an average for your last lap, add one of the following numbers, based on your personal fitness level, to it. This sum is an estimate of your submaximal heart rate.

Unfit	20 bpm
Fit	30 bpm
Very fit	40 bpm
Competitive athlete	50 bpm

For example, if your average heart rate on the final lap was 135 bpm, and you are of average fitness, you would add 30 bpm. Hence, your estimated submaximal heart rate would be 165 bpm.

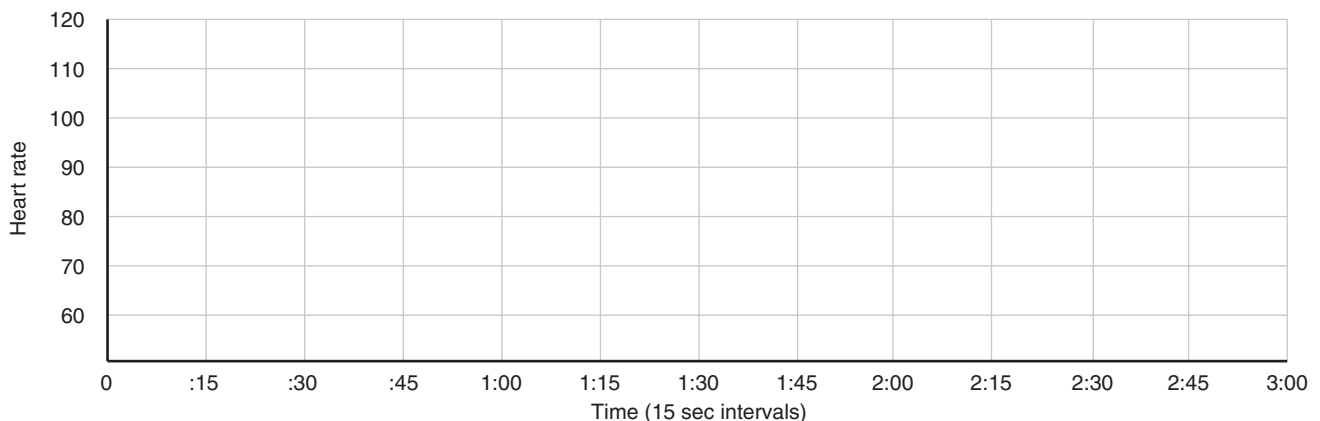
$$\frac{\text{Last lap average heart rate} + \text{Fitness quotient}}{\text{Estimated maximal heart rate}} =$$

Step Test

Use an 8-inch (20 cm) step (almost any step in your school or home will do) and perform a three-minute step test. After you warm up, step up and down in a four-count sequence as follows: right foot up, left foot up; right foot down, left foot down. Each time you move a foot up or down, it counts as one step. Count “up, up; down, down” for one set, performing 20 sets in one minute. It is important that you don’t speed up the pace. Keep it even.

Every 15 seconds, have a partner record your heart rate. You can predict your MHR by adding to your last minute’s average heart rate one of the following numbers based on your current cardiovascular fitness level:

Unfit	20 bpm
Fit	30 bpm
Very fit	40 bpm
Competitive athlete	50 bpm



My last minute’s average heart rate is _____ bpm.

Cardiovascular fitness adjustment: + _____ bpm

My estimated MHR for the step test is _____ bpm.

Talk Test

Exercise until you can no longer talk comfortably (i.e., until you are too short of breath to talk). Take your heart rate and, based on your current cardiovascular fitness level, add one of the following numbers to determine your estimated MHR:

Unfit	20 bpm
Fit	30 bpm
Very fit	40 bpm
Competitive athlete	50 bpm

Biggest Number Test

Warm up completely before starting this test. Then, exercise at full intensity for one to five minutes. Use the highest observed heart rate for the MHR value.

Chair Test

Using a standard chair, stand up and sit down using a rhythmic cadence (i.e., stand up, sit down; stand up, sit down). After a brief warm-up, perform this activity for three minutes. Use the last minute's average heart rate and add one of the following numbers based on your aerobic condition:

Unfit	20 bpm
Fit	30 bpm
Very fit	40 bpm
Competitive athlete	50 bpm

Two-by-Four-Minute Test

After a thorough warm-up, gradually increase your effort and heart rate number until you reach a point that you believe is the highest heart rate you can sustain for four minutes. Exercise at this heart rate for four minutes, and then decrease your effort and recover for two minutes. Repeat this series again; then average the two four-minute heart rate numbers and use this number as your estimated MHR.

The two-by-four-minute number is also known as your maximal sustainable heart rate and is the highest heart rate you can sustain twice for four minutes.

Mathematical Formula

You can also estimate your MHR using mathematical formulas, although these have limitations. Most important, they do not reflect differences that exist in MHR among people of the same age. The advantages of using a mathematical formula to estimate MHR are that it does not require any physical activity, it is fast, and it does not require you to be in shape.

List the following personal information and complete the computations:

1. Your age in years:
2. Divide your age in half:
3. Your weight in pounds:
4. Multiply your weight in pounds by 0.05:
5. Put these numbers into the following formula:

$$210 - (1/2 \text{ age}) - (0.05 \times \text{weight [lb]}) + 4 \text{ (boys) or } + 0 \text{ (girls)} \\ = \text{mathematical estimate of MHR}$$

$$210 - \underline{\hspace{2cm}} - \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Estimating Maximal Heart Rate

After completing the six submaximal heart rate tests and the mathematical MHR formula, add the seven estimated values together and divide by 7 to determine your average MHR. Use this number as your general fitness MHR measure to set your heart zones.

$$\begin{aligned} & (1\text{-mile [1.6 km] walking test submaximal heart rate: } \underline{\hspace{2cm}} \\ & \quad + \text{ step test submaximal heart rate: } \underline{\hspace{2cm}} \\ & + \text{ talk test heart rate: } \underline{\hspace{2cm}} + \text{ biggest number test heart rate: } \underline{\hspace{2cm}} \\ & \quad + \text{ chair test heart rate: } \underline{\hspace{2cm}} + \text{ two-by-four heart rate: } \underline{\hspace{2cm}} \\ & + \text{ mathematically calculated MHR: } \underline{\hspace{2cm}}) / 7 = \underline{\hspace{2cm}} \text{ (estimated MHR)} \end{aligned}$$

What I learned: