Data sheet Heart rate

The heart rate (HR) is the number of times the heart beats each minute. Exercise causes the heart rate to increase. After the exercise, the heart rate drops back to its 'resting rate'. The *maximum heart rate* (MHR) is the recommended maximum a person should reach during exercise.

Calculating MHR

There are a number of ways to calculate a value of MHR based on age. These methods are only approximate because individuals vary in their physical ability. Two such methods are presented below:

Simple method

A simple way to calculate MHR is to subtract your age (in years) from 220:

MHR = 220 – age (in years)

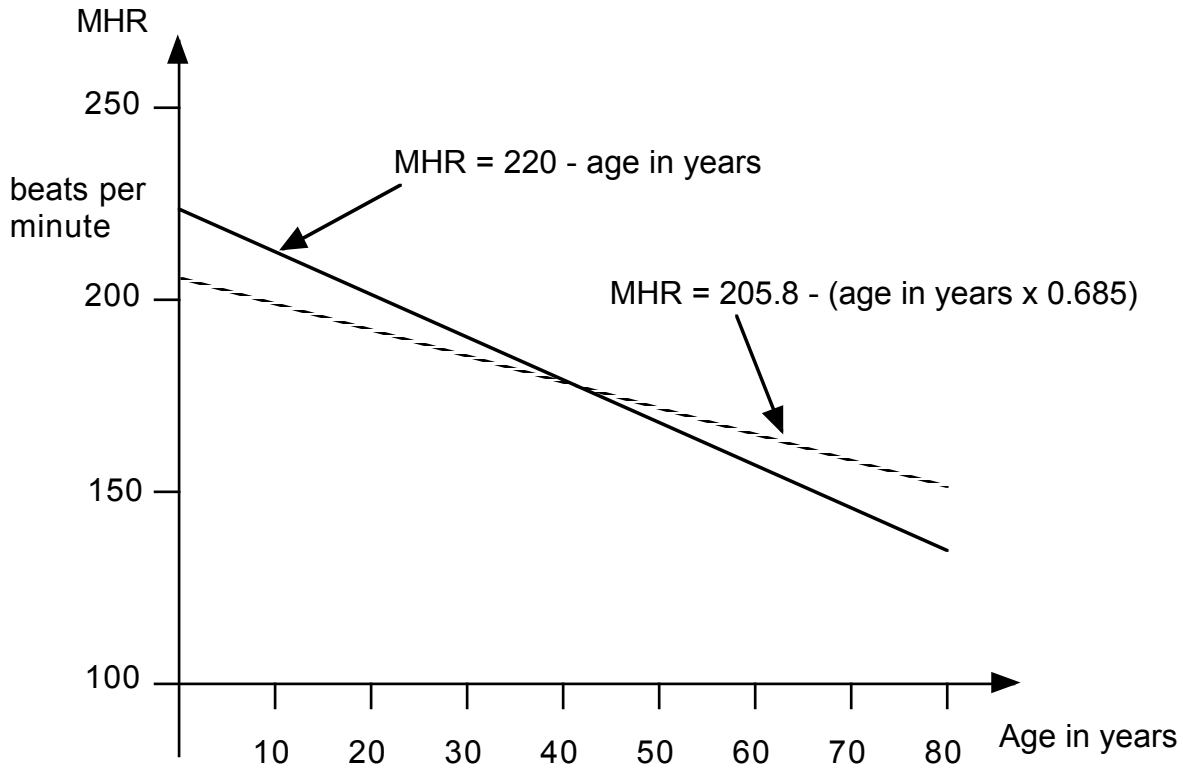
A more accurate method

The simple method of calculation does not give particularly accurate results.

A more reliable formula, though still approximate, is this:

MHR = 205.8 – (age in years x 0.685)

Here are the graphs of the two ways of calculating MHR.



Measuring MHR

The direct way to measure MHR is to monitor the person's heart as they do strenuous exercise. This does, however, carry some risk if a person is not used to such exercise.

Different training levels

People who want to improve their physical fitness often take part in a training programme.

There are a number of levels at which you can exercise in such a programme depending on the percentage of maximum heart rate that is to be reached.

These levels are given in the table below.

Level	**Description**
Healthy heart level (warm up) *Target = 50 - 60% of MHR*	The easiest level and the best one for people just starting up a fitness program. It can also be used as a warm up for training competitive walkers
Fitness level (fat burning) *Target = 60 - 70% of MHR*	This level is a little more demanding than the *Healthy heart level* and so burns more calories.
Aerobic level (endurance training) *Target = 70 - 80% of MHR*	This level will increase the size and strength of your heart. It is the preferred level if you are training for an endurance event.
Anaerobic level (performance training) *Target = 80 - 90% of MHR*	This level will increase the greatest amount of oxygen you can consume during exercise, so you can fight fatigue better.
Red level (maximum effort) *Target = 90 - 100% of MHR*	This level burns the highest number of calories and it is very intense. Most people can only stay at this level for short periods.

Questions Heart rate

1

Stephen is working at 65% of his maximum heart rate.
What level is he exercising at?

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2

Use the two methods for calculating MHR to find the MHR for a 25-year-old.

	MHR in beats per minute	
	simple method	more accurate method
25-year-old	- - - - - - - - - -	- - - - - - - - - -

3

Use the graphs on the data sheet to find:

(a) The approximate age at which both methods give the same result for MHR.

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(b) Eshan designs a fitness program for people under the age of 25.
He uses the simple method to calculate the MHR.
Explain why this could lead to exercise which is too strenuous for this group.

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4

Alex is 30 years old.
She is training at the Aerobic level (endurance training).
She is going to use the more accurate method to calculate maximum heart rates.

(a) What is the lowest maximum heart rate she should be aiming for in her training?

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(b) What is the highest maximum heart rate she should be aiming for in her training?

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5

Phil is a 50-year-old who calculates his MHR using the simple method.
A friend tells him that the more complicated method is better.
He decides to re-calculate his MHR using the more complicated method.

Find the percentage change in Phil's MHR when going from the simple to the more complex method.

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