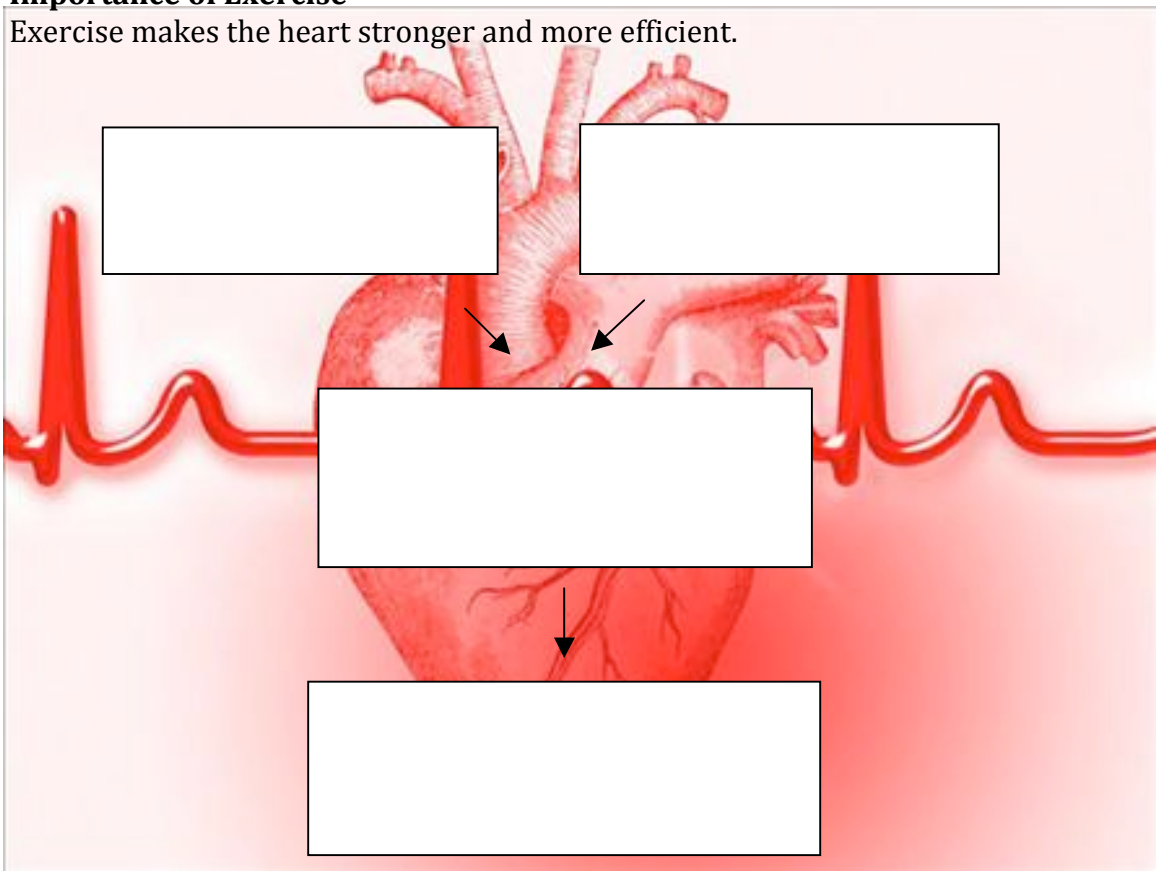
2.2 Heart Fitness

Cardiorespiratory fitness is often considered the most important element of physical fitness because increased cardio fitness is linked to decreased heart disease risk.

Importance of Exercise

Exercise makes the heart stronger and more efficient.



- ➔ The more you exercise, the stronger and more efficient the heart becomes.
- ➔ The stronger your heart is, the easier it is to exercise.

It is common for fit people to have a lower _____ heart rate than unfit people.

Note: More is not *always* better. Recent studies indicate that exercising _____ _____ without gradually strengthening the heart over a period of time can cause more _____ than good, especially in people with pre-existing heart conditions. It is important to use common sense and _____ build cardiovascular fitness rather than jumping in too suddenly.

Cardiac Output

Cardiac output (Q) is the amount of blood pumped out by each side of the heart in one minute. This is a measure of right and left ventricle function. Cardiac output is a combination of heart rate (HR) and stroke volume (sv).

Cardiac Output =

Example

If a fitness participant's heart rate at rest is 75 BPM and stroke volume is 75 ml of blood/beat, what is the cardiac output (Q)?

$Q = HR \times SV$

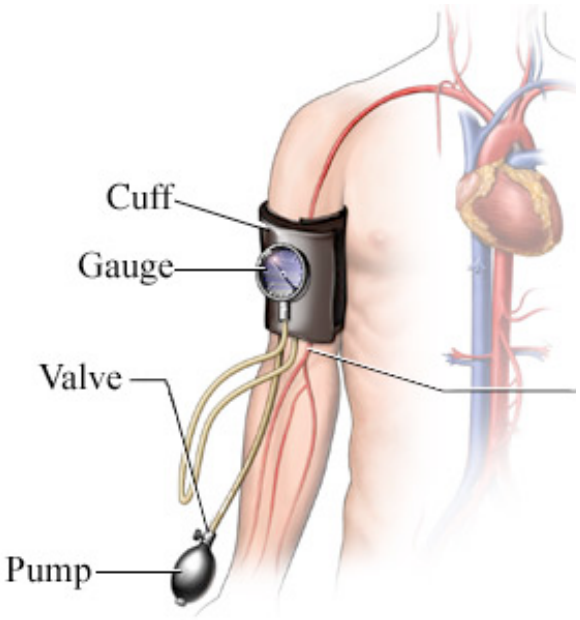
$Q =$

$Q =$

Blood Pressure

Blood pressure is another good indicators of cardiovascular function. Blood pressure (BP) is the pressure exerted by blood against the walls of the large arteries in the systemic circulation system. Pressure is necessary to keep the blood flowing through the systemic and pulmonary circulatory systems. Blood pressure is usually measured at the brachial artery (upper arm).

Normal Blood Pressure Range



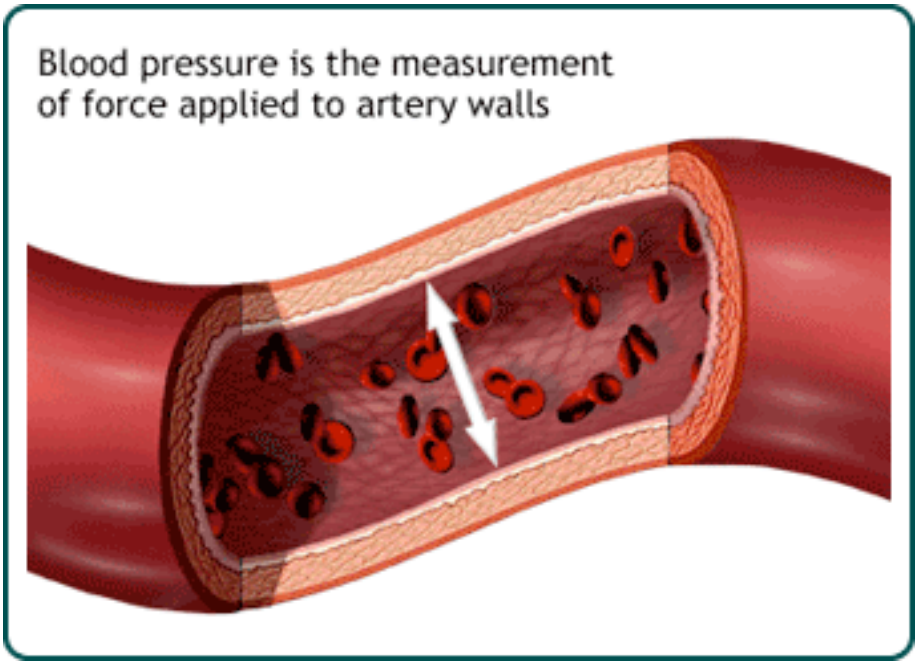
Systolic (upper number):
The pressure in the arteries when the heart is _____
_____

Diastolic (lower number):
The pressure in the arteries when the heart is _____
_____
_____

Factors Affecting Blood Pressure
Blood pressure is directly influenced by cardiac output. The greater the heart rate and stroke volume, the greater the blood pressure.

Other factors also affect blood pressure:

1) Resistance To Blood Flow	
2) Nervous System	
3) Kidney Function	
4) Diet	
5) Venous Pooling	
6) Blood Distribution	



Too Low: Hypotension	**Too High: Hypertension**
Low blood pressure is not always bad. One of the benefits of aerobic physical conditioning may be a lowering of blood pressure in individuals who have higher than average readings.	Although blood pressure commonly rises during exercise for a short period of time, chronic hypertension (consistently high, even after exercising) is a health risk. Increased blood pressure increases work on the heart and blood must be pumped through smaller vessels (this would be like putting your finger over the end of a hose).

Response of the Cardiorespiratory System to Exercise

Resistance Exercise
Resistance exercise with an _____ can cause a dramatic rise in _____ _____ because of the increased resistance to blood flow. The strain compresses the arteries and the heart must pump harder to drive the blood through the body. It is not uncommon to see systolic blood pressure values of greater than 230 mm Hg for brief periods during maximal work in healthy individuals. Patients, clients or fitness participants with heart problems or hypertension may be at increased risk during this type of exercise. Low intensity; 'aerobic' exercise or high repetition, low resistance exercise would be more suitable for this individual.

Upper Body Exercise
During _____ and upper body exercise or movements, the workload on the _____ _____ and so does _____ _____.
For example, when performing shoulder press exercises or reaching for something on a top shelf, the heart must pump blood through small vessels and against gravity (compared to the lower body). As a result, systolic blood pressure rises.

Start of Aerobic Exercise
During the first few minutes of aerobic exercise, heart rate, breathing rate and oxygen consumption all _____ _____ then eventually _____ and reach a plateau or steady state. During exercise, steady state heart rate indicates that oxygen needs of the body are being met and energy is being produced through aerobic systems. Each change in exercise intensity will result in a new 'steady-state' heart rate.

Maximum Heart Rate (MHR)
Maximum heart rate is the heart rate reached during an exhaustive training effort. This value stays consistent on a day-to-day basis but does decline with age.

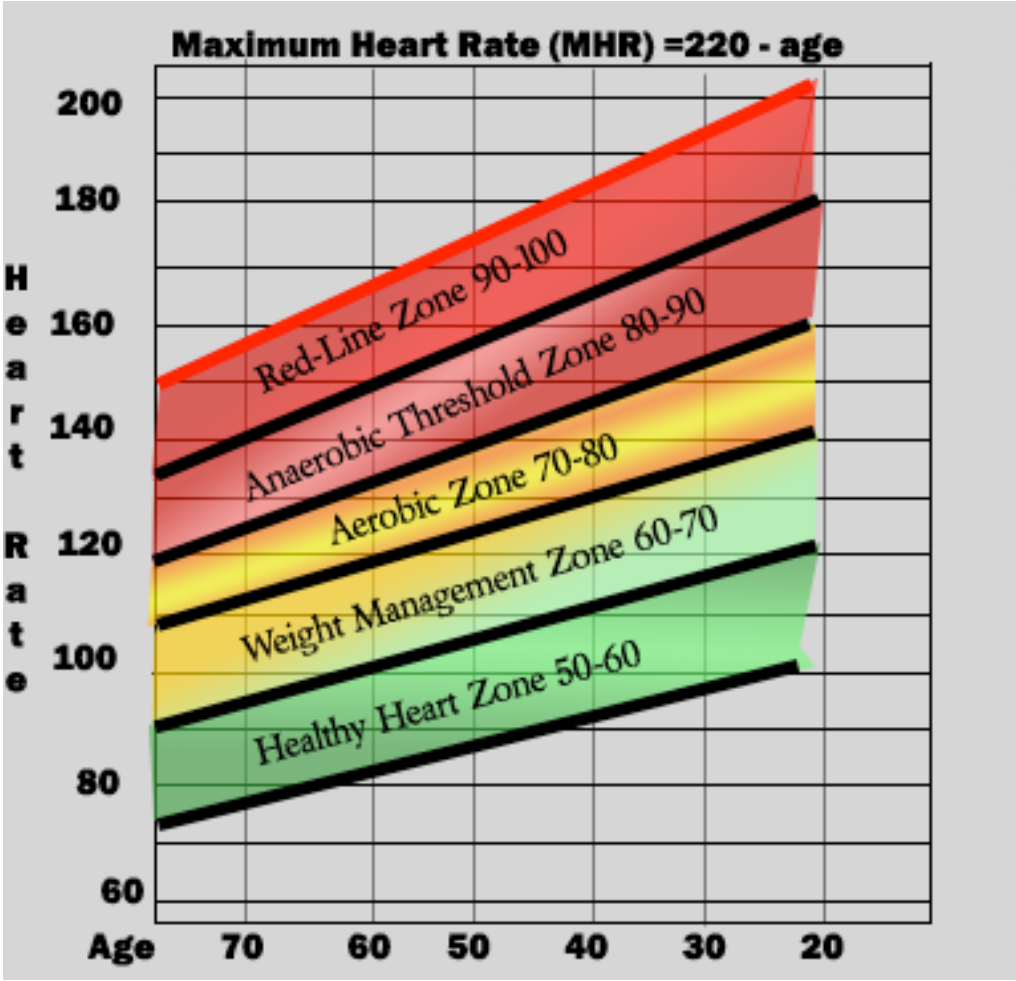
Maximum Heart Rate (MHR) =

Target Heart Rate (THR) is a _____ of Maximal Heart Rate (MHR). Based on the percentage determined during goal setting, an upper and lower target can be calculated.

Example:
For a 40 year old male the MHR =

THR upper limit of training might be 85%:

THR lower limit of training might be 70%:



Long Term Effects of Training on Heart Rate

The average resting heart rate (RHR) is between _____ beats per minute (BPM). For poorly trained individuals, it can be much higher. Aerobically trained athletes can have a resting heart rate as low as 30-40 BPM, and still meet the energy needs of the body.

Recovery Heart Rate and Blood Pressure

Following aerobic exercise, heart rate rapidly declines to near resting levels in _____. The fitter the individual (aerobically), the faster the heart rate returns to the resting level. For healthy and hypertensive individuals, there is a slight _____ in systolic _____ that lasts for up to 12 hours following exercise.