

Unit IX – Problem 1 – Physiology Lab: Physical Fitness Workshop



- What are the measures of fitness:

- **BMI (Body Mass Index)** = $\frac{\text{mass (kg)}}{\text{height}^2(\text{m})}$

BMI (kg/m ²)	Category
< 18.5	Underweight
18.5 – 24.9	Normal
25 – 29.9	Overweight
> 30	Obese

- **Body fat percentage:** a fit person has a low percentage of fat (males: 18% - females: 21%).
- **Heart Rate (HR)**
- **Blood pressure**

- Waist to hip ratio:

- **Definition:** it is the ratio of the circumference of the waist to that of the hips.
- **Normal values:**
 - ✓ Males: 1 or lower.
 - ✓ Females: 0.8 or lower.

- Important terms used in exercise physiology:

- **Aerobic exercise:** it is the one which is characterized by maximal oxygen consumption VO₂ max. In this type of exercise, the physical performance extends for a long period of time. In addition, there is burning of fat stores in the body → weight loss.
 - ✓ Example: isotonic contraction (same tone/tension although the length of the muscle is decreasing → there is shortening of the muscle).
- **Anaerobic exercise (high intensity exercise for brief period):** it is the one in which energy is provided for a short period of time by the following energy systems:
 - ✓ ATP-CP energy system (phosphagen system) = 6 seconds.
 - ✓ Glycolytic (anaerobic) energy system = 1-2 minutes.Example: isometric contraction (length of the muscle is not changing but the tension is increasing resulting in increased systolic and diastolic blood pressure).

- How to determine the intensity of exercise:

- **Maximum heart rate** = 220 – age
 - ✓ Low intensity exercise = < 60% of maximum heart rate.
 - ✓ High intensity exercise = 60-85% of maximum heart rate.

- Methods for estimating threshold and target zones of heart rate:

- **Reserve heart rate** = maximum heart rate – resting heart rate.
- **Lower threshold training heart rate** = reserve heart rate x 60% + resting heart rate.
- **Maximal threshold training heart rate** = reserve heart rate x 85% + resting heart rate.

- What factors must be considered for designing exercise program?

- **F** Frequency
- **I** Intensity (determined by resting HR or that during exercise or immediately after exercise)
- **T** Time

- Evaluating cardiovascular fitness (you must memorize 2-3 tests for the sake of exam):

- **Treadmill test:**
 - ✓ Continuous monitoring of ECG.
 - ✓ Assessment of maximal oxygen consumption/uptake (best).
- **12 minute run test:** it determines the distance you can run in twelve minutes (a normal person between 17-20 years can run 1.5 miles).
- **Step test:** in which you step up and down on a twelve inch high bench for 3 minutes at a rate of (24 times/min). You have to measure the heart rate after the exercise (normal: 85-95).
- **Walking test:** in which you calculate the walking time and post-exercise heart rate after the person walks 1 mile as fast as he can.
- **Bicycle test:** set a stationary bicycle work load on (300-1200 kpm/min) and ride it for 6 minutes at a rate of (50/min) → calculate the heart rate in the 6th minute