Physical Education

Yr 8 Long and Short term effects of Exercise ***Autumn*** *1*

	Keyword	Meaning
1	Muscle fatigue	When you exercise, your muscles feel weak, painful and tired. This is muscle fatigue.
2	Oxygen debt	When you exercise hard, you use up more oxygen than you take in. This shortfall creates an oxygen debt. When you finish exercise, as you recover you keep breathing deeply, so that you can "repay" this oxygen debt.
3	Cardiac output	is the amount of blood pumped by the heart in one minute. **Cardiac output = SV X HR.**
4	Aerobic respiration	The process of releasing energy from glucose using oxygen e.g. when jogging.
5	Anaerobic respiration	The process of releasing energy from glucose without oxygen e.g. when sprinting.
6	Pulse	Used to measure heart rate, it is located at 2 sites with the radial (wrist) and carotid (neck) arteries.
7	Resting heart rate	The amount of times the heart beats per minute whilst at rest. The average figure is around 72 (bpm).
8	Working heart rate	The heart rate figure taken during or immediately after exercise. This will vary depending on intensity.
9	Maximum heart rate	Your heart rate maximum is the highest number of beats your heart makes when exercising. **A formula to work this out is 220 - age.**
10	Recovery heart rate	The time taken for the heart rate to return to resting immediately after exercise. The quicker this takes the fitter the sportsperson

Short-term effects on Muscular System

Muscle fatigue
When you exercise, your muscles feel weak, painful and tired. This is muscle fatigue.

Lactate accumulation
When there is not enough oxygen available, your cells respire anaerobically and there is lactate accumulation. This causes muscles to feel painful and tired.

Increase in muscle temperature
During exercise the temperature of muscles will increase. This is when you undergo a pulse raiser at the start of a warm up.

Muscle cramp
When a sportsperson has played for a long time or is suffering dehydration they can suffer cramp. Cramp is a severe type of muscle fatigue causing the muscle to contract in a painful way.

Short-term effects on the Cardiorespiratory System

Increase in heart rate
Average heart rate at rest is 72 beats per minute (bpm). During exercise this increases depending on the intensity of exercise. This is because of the greater demands the working muscles have for oxygen.

Increase in stroke volume
Stroke volume is the amount of blood ejected by the heart during each beat. At rest stroke volume may be around 75ml per beat but when exercising this could increase to 130ml. This is to meet the additional demands for oxygen.

Increase in cardiac output
Cardiac output is the amount of blood pumped by the heart in one minute. Cardiac output is determined by 2 factors – heart rate (HR) and stroke volume (SV).
When you exercise cardiac output rises as the intensity of the activity increases to meet the body's needs.

Short-term effects on the Cardio-respiratory System (continued)

Effects of exercise on breathing
When you exercise you need to bring in more oxygen and get rid of more carbon dioxide. Therefore as you exercise the rate and depth of breathing increases so that you can bring in and get rid of more air with each breath you take in.

Oxygen debt
When you exercise hard, you use up more oxygen than you take in. This shortfall creates an oxygen debt. When you finish exercise, as you recover you keep breathing deeply, so that you can "repay" this oxygen debt.

Long-term effects on Musculo-skeletal System

Increase in bone density
Weight-bearing exercises put bones under stress. In response your body produces more cells that build new bone.

Increase strength of ligaments and tendons Weight-bearing exercise also increases the strength of ligaments, which attach bone to bone, and tendons which attach muscle to bone, reducing the chance of injury.

Muscle hypertrophy
Strength training affects muscle fibres increasing both size and strength of skeletal muscle. High weight/Low rep = improvement in muscular strength. Low weight/High rep = improvement in muscular endurance.

Rest for adaptation and recovery
The body's ability to react and improve to a training load is known as adaptation.
Adaptation occurs during the recovery process after the training session is completed.

Long-term effects on the Cardiorespiratory System

Cardiac hypotrophy
Training increases the heart muscle in size, thickness and strength.

Decreased resting heart rate
Your resting heart rate (RHR) is an indication of fitness. The heart rate of a fitter person beats fewer times per minute due to the heart getting bigger and stronger.

Faster recovery rate
This is the speed at which heart returns to RHR after exercise. The faster this is = fitter.

Increased resting stroke volume
Stroke volume (SV) is the amount of blood ejected from the heart per beat. This increases at rest and work. The heart becomes bigger, stronger and more efficient due to exercise.

Maximum cardiac output
Cardiac output is the amount of blood ejected from the heart per minute. Calculate by HR X SV. This also increases due to greater efficiency of the heart.

Long-term effects on the Cardio-respiratory System (continued)

Increase capillaries: Improved fitness increases the number of capillaries resulting in better delivery of oxygen to working muscles.

Drop in resting blood pressure: This is due to the muscular wall of the veins and arteries becoming more elastic. Exercise also reduces weight which in turn will reduce blood pressure.

Increased lung capacity/volume and vital capacity: Lung volume will increase after a sustained period of regular training. Vital capacity will increase as a result of a more efficient respiratory system (hypotrophy of the diaphragm and intercostal muscles).
Increased number of alveoli: more alveoli become available for gaseous exchange.

Key Terms

Recovery
-The time required for the repair of damage to the body caused by training or competition. Alternatively, the period between sets of a given exercise or between intervals in an interval training session. Rest
-A period of lower intensity during a workout that allows for a drop in heart rate.
Coronary Heart Disease
-When your coronary arteries are narrowed by a slow build-up of fatty material in the inner walls. Alveoli
-Tiny sacs within our lungs that allow oxygen and carbon dioxide to move between the lungs and bloodstream. Diaphragm
-The primary muscle used in the process of inspiration, or inhalation. It is a domed shaped sheet of muscle that separates the chest from the rest of the body cavity.
Vital Capacity
-The greatest number of air that can be expelled from the lungs after taking the deepest possible intake of breath.

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3	Cardiac output	
4	Aerobic respiration	.
5	Anaerobic respiration	
6	Pulse	
7	Resting heart rate	
8	Working heart rate	
9	Maximum heart rate	
10	Recovery heart rate	

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Short-term effects on Muscular System	Short-term effects on the Cardiorespiratory System	Short-term effects on the Cardio-respiratory System (continued)
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Long-term effects on Musculo-skeletal System	Long-term effects on the Cardiorespiratory System	Long-term effects on the Cardio-respiratory System (continued)
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		Key Terms

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Question	Answer
1-Identify the short term effects of exercise on the muscular system?	
2-What does the term muscle fatigue mean?	
3-Explain why heart rate, breathing rate & depth increase during exercise.	
4-Explain what the process of oxygen debt is.	
5-What is the difference between resting heart rate, working heart rate and recovery heart rate?	
6-What are the short term effects of exercise on the cardio-respiratory system?	
7-What is the difference between aerobic and anaerobic respiration?	
8-What are the long term effects of exercise on the cardio-respiratory system?	
9-What are the long term effects of exercise on the musculo-skeletal system?	
10-How do we calculate maximum heart rate?	
11-What is stroke volume (SV)?	
12-What is cardiac output (CA)?	
13-What is vital capacity?	
14-What does the term hypotrophy mean?	
15-Explain why maximum cardiac output increases as a result of regular sustained exercise.	