

1.3 Anaerobic & Aerobic Exercise

1.4 The Short & Long Term Effects of Exercise

Name _____

Class _____



| Topic | Description from Specification | Pupil comments – How confident do you feel on this topic? |
|--|---|---|
| Understanding the terms aerobic exercise (in the presence of oxygen) and anaerobic exercise (in the absence of enough oxygen) | Definition of the terms: aerobic exercise, anaerobic exercise. Summary of aerobic exercise (glucose + oxygen → energy + carbon dioxide + water). Summary of anaerobic exercise (glucose → energy + lactic acid). | |
| The use of aerobic and anaerobic exercise in practical examples of differing intensities | Link practical examples of sporting situations to aerobic or anaerobic exercise. Identification of the duration and/or intensity of a physical activity in order to identify and justify why it would be aerobic or anaerobic, eg. marathon (aerobic), sprint (anaerobic). | |
| Excess post-exercise oxygen consumption (EPOC)/oxygen debt as the result of muscles respiring anaerobically during vigorous exercise and producing lactic acid | Definition of the term EPOC (oxygen debt). An understanding that EPOC (oxygen debt) is caused by anaerobic exercise (producing lactic acid) and requires the performer to maintain increased breathing rate after exercise to repay the debt. | |
| The recovery process from vigorous exercise | The following methods to recover from exercise, including the reasons for their use: Cool down – maintain elevated breathing rate/ heart rate (blood flow), stretching, removal of lactic acid. Manipulation of diet – rehydration, carbohydrates for energy, ice baths/massage – prevention of delayed onset of muscle soreness (DOMS). Be able to evaluate the use of these methods, justifying their relevance to different sporting activities. | |
| Immediate effects of exercise (during exercise) | Hot/sweaty/red skin, increase in depth and frequency of breathing, increased heart rate. | |
| Short-term effects of exercise (24 to 36 hours after exercise) | Tiredness/fatigue, light headedness, nausea, aching/delayed onset of muscle soreness, (DOMS)/cramp. | |
| Long-term effects of exercise (months and years of exercising) | Body shape may change, improvements in specific components of Fitness, build muscle strength, improve muscular endurance, improve speed, improve suppleness, build cardio-vascular endurance, improve stamina, increase in the size of the heart (hypertrophy), lower resting heart rate (bradycardia). | |

Energy:

_____ require energy to work. That energy comes from _____, which is mainly converted to **glucose** in the body. The _____ and _____ store **glucose** as **glycogen**. This can be converted back to glucose for use during exercise.

Aerobic Respiration:

This is the usual process for releasing energy for your muscles. **Aerobic** means with _____.

The equation for aerobic respiration is:

Anaerobic Respiration:

When your muscles have to work at a very intense level, **Anaerobic respiration** takes place. **Anaerobic** refers to producing energy without _____. Glucose is still used but now there is a waste product called lactic acid.

The equation for anaerobic respiration is:

Would the following activities require aerobic or anaerobic respiration?



Lactic Acid:

This is toxic and causes your muscles to ache and cramp (and eventually stop working). **Lactic acid** builds up following anaerobic exercise due to a lack of _____ being present in the muscles. This is known as **oxygen debt**.

Oxygen debt leads to **Excess Post-Exercise oxygen consumption (EPOC)**. This is when there is an increased rate of oxygen intake following activity – in order to pay back the **oxygen debt**.

A 400m runner has experienced muscle aches and cramps at the end of a race. Why have they experienced this and how will their cardio-respiratory system work to reduce these cramps? Refer to **EPOC** and **oxygen debt** in your answer.



The recovery process from vigorous exercise:

Recovering from vigorous exercise is important, especially for elite performers.

Why is a faster recovery time beneficial?

Methods of recovery:

1. **Cool Down.** A light jog and some stretches will keep the breathing rate and depth slightly higher, enabling to get more oxygen to the muscles which will help with recovery.

Using a cool down is always a good idea, but is it more important following aerobic or anaerobic activity?

2. **Manipulation of diet.** A performer must think carefully about what they eat and drink in the hours after exercise in order to replenish their stores. Carbohydrates can restore the energy levels in the body and proteins can help to build and repair damaged muscle tissue.

How would the post-exercise meal differ for a marathon runner and a weight lifter? Give examples of the types of food that they would eat.

3. **Ice baths/Massage.** These recovery methods are used by performers who want to try to prevent **DOMS (delayed onset of muscle soreness)**. DOMS can occur 24-72 hours after strenuous activity where the muscles fibres have experienced microscopic tears.

Think back to a time that you have experienced DOMS. What activity caused this soreness? Why did it occur on this occasion? How long did it take to go away?

The Effects of Exercise

Taking part in exercise has a huge effect on our bodies. The effects that exercise has can be split into 'immediate' 'short-term' and 'long-term'.

Hint – Use the 'key terms' at the back of the booklet if you are unsure about any of the information given

The immediate effects of exercise:

| Effect | Explanation |
|--------|-------------|
| | |
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| | |

The short term effects of exercise (24 – 36 hours after exercising)

| Effect | Explanation |
|---------------|--------------------|
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The long-term effects of exercise (months and years):

| Effect | Explanation |
|---------------|--------------------|
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Sample Exam Questions

Explain two ways that a 200m runner can reduce the chance of muscle soreness following a race. **(4 marks)**

Reason 1:

Reason 2:

Two pupils take part in a sprint training session. **State** three **immediate** effects the training session may have on the pupils. **(3 marks)**

Ibrahim has been training as a long distance runner for 4 years. Describe a long term effect of exercise that Ibrahim will have experienced and explain how this will have aided his performance as a runner. **(3 marks)**



Key Terms:

Aerobic Respiration: The process of releasing energy from glucose, using oxygen.

Anaerobic Respiration: The process of releasing energy from glucose, without oxygen.

Aerobic Exercise: Exercising at a moderate intensity, allowing the body to utilise oxygen for energy production

Anaerobic Exercise: Exercising at a high intensity, not allowing the use of oxygen for energy production.

Lactic Acid: A toxic acid produced in muscles during anaerobic exercise. Causes muscle cramps.

Oxygen Debt: The amount of oxygen needed at the end of physical activity to break down any lactic acid.

EPOC: Excess Post-Exercise oxygen consumption. This is when there is an increased rate of oxygen intake following activity – in order to pay back the oxygen debt.

DOMS: Delayed onset of muscle soreness. This occurs 24-72 hours after strenuous activity.

Protein: Food source important for the repair and growth of muscle tissues.

Carbohydrates: The body's main source of energy. Split into complex and simple forms.

Cardiac Hypertrophy – Increase in the size and strength of the heart.